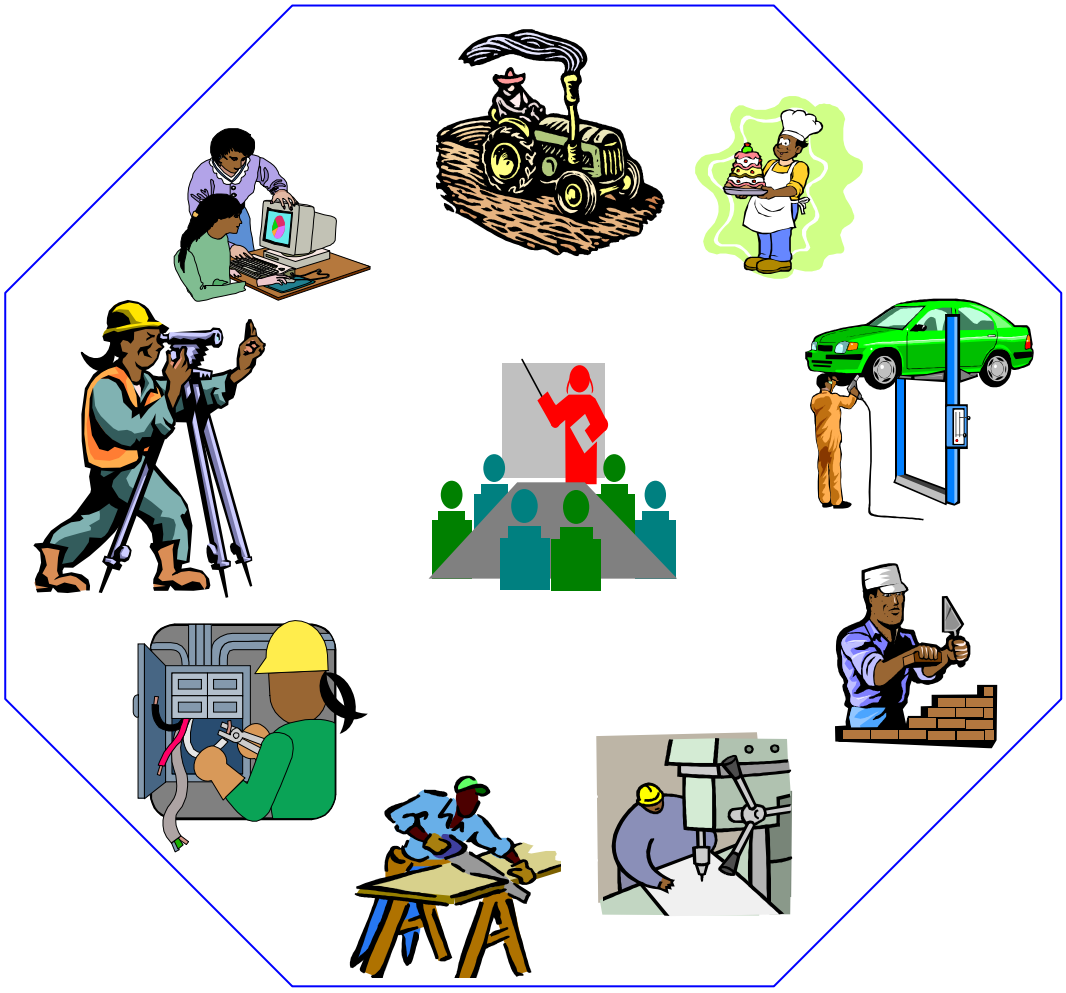
Federal Democratic Republic of Ethiopia

OCCUPATIONAL STANDARD

MINING AND MINERAL PROCESSING

NTQF Level V



Ministry of Education
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Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standards (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF). They are national Ethiopian standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.
A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title and NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance criteria
- Variables and Range statement
- Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit of Competence:

- chart with an overview of all Units of Competence for the respective level including the Unit Codes and the Unit Titles
- contents of each Unit of Competence (competence standard)
- occupational map providing the Technical and Vocational Education and Training (TVET) providers with information and important requirements to consider when designing training programs for this standards and for the individual, a career path

UNIT OF COMPETENCE CHART

Occupational Title: Mining and Mineral Processing

Unit Code: MIN MPR

NTQF Level V

MIN MPR5 01 0114 Manage Quality Customer Services	**MIN MPR5 02 0114** Identify, Implement and Maintain Legal Compliance Requirements	**MIN MPR5 03 0114** Implement Emergency Preparedness and Response Systems
MIN MPR5 04 0114 Implement Systems and Methods of Mining	**MIN MPR5 05 0114** Implement and Maintain Management Systems to Control Risk	**MIN MPR5 06 0114** Manage Blast Hole Drilling Operations
MIN MPR5 07 0114 Manage, Operate and Maintain the Mine Ventilation System	**MIN MPR5 08 0114** Implement, Monitor, Rectify and Report on Inventory Control System	**MIN MPR5 09 0114** Implement the Gas Drainage Management Plan
MIN MPR5 10 0114 Implement the Outburst Management Plan	**MIN MPR5 11 0114** Implement the Site Water Management Plan	**MIN MPR5 12 0114** Implement Pit Plan
MIN MPR5 13 0114 Develop, Implement and Maintain Process Control System	**MIN MPR5 14 0114** Establish and Maintain Mine Services Systems	**MIN MPR5 15 0114** Undertake Process or Project Environmental Impact Assessment
MIN MPR5 16 0114 Implement Mine Transport Systems and Production Equipment	**MIN MPR5 17 0114** Implement, Monitor, Rectify and Report on Contracts	**MIN MPR5 18 0114** Manage Major Incidents and Emergencies

MIN MPR5 19 0114 Manage Project Quality	**MIN MPR5 20 0114** Facilitate and Capitalize on Change and Innovation	**MIN MPR5 21 0114** Manage Continuous Improvement Process (Kaizen)

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Manage Quality Customer Services**
Unit Code	**MIN MPR5 01 0114**
Unit Descriptor	This unit describes the performance outcomes, skills and knowledge required to develop strategies to manage organizational systems that ensure products and services are delivered and maintained to standards agreed by the organization.

Elements	Performance Criteria
1. Plan to meet internal and external customer requirements	1.1. The needs of ***customers*** are investigated, identified, assessed, and included in planning processes 1.2. Plans achieve the ***quality***, time and cost specifications agreed with customers are ensured.
2. Ensure delivery of quality products and/or services	2.1. Products and/or services are delivered to customer specifications within organization's business plan. 2.2. Team performance is managed to consistently meet the organization's quality and delivery standards. 2.3. Colleagues are assisted to overcome difficulty in meeting customer service standards using leadership, supervision, coaching and mentoring.
3. Monitor, adjust and review customer service	3.1. ***Strategies*** are developed and used to monitor progress in achieving product and/or service targets and standards. 3.2. Strategies are developed and used to obtain customer feedback to improve the provision of products and/or services. 3.3. ***Resources*** are developed, procured and used effectively to provide quality products and/or services to customers. 3.4. Decisions are made to overcome problems and to adapt customer services, products and/or service delivery in consultation with appropriate individuals and groups. 3.5. Records, reports and recommendations are managed within the organization's systems and processes.

Variable	Range
Customers	May be: • Board members • clients, purchasers of services

	• co-workers, peers and fellow frontline managers • members of the general public who make contact with the organization, such as prospective purchasers of services • potential funding bodies • supervisors • suppliers of goods and services and contractors providing goods and services
Quality	May refer to: • characteristics of a product, system, service or process that meet the requirements of customers and interested parties
Strategies	May refer to: • databases and other controls to record and compare data over time • electronic feedback mechanisms using intranet, internet and email • feedback forms and other devices to enable communication from customers • long-term or short-term plans for monitoring achievement and evaluating effectiveness • policies and procedures • questionnaires, survey and interviews • training and development activities
Resources	May include • buildings/facilities • equipment • finance • information • people • power/energy • technology • time

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • plans, policies or procedures for delivering quality customer service • demonstrated techniques in solving complex customer complaints and system problems that lead to poor customer service • knowledge of techniques for solving complaints
Underpinning Knowledge and	Must demonstrate knowledge of: • techniques for solving complaints including the principles

Attitudes	and techniques involved in the management and organization of: ➢ customer behavior ➢ customer needs research ➢ customer relations ➢ ongoing product and/or service quality ➢ problem identification and resolution ➢ quality customer service delivery ➢ record keeping and management methods ➢ strategies for monitoring, managing and introducing ways to improve customer service relationships ➢ strategies to obtain customer feedback.
Underpinning Skills	Must demonstrate skills of: • communication, coaching and mentoring skills to provide support to colleagues • problem-solving skills to deal with complex and non-routine difficulties.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Identify, Implement and Maintain Legal Compliance Requirements**
Unit Code	**MIN MPR5 02 0114**
Unit Descriptor	This unit covers the identification, implementation and maintenance of legal compliance requirements in the resources and infrastructure industries. It includes providing information about the scope, implementation, management, prioritization and training for legal compliance requirements. It also provides information about implementing and monitoring procedures for maintaining legal records and for dealing with non-compliance events.

Elements	Performance Criteria
1. Provide information about the scope of legal and organizational compliance procedures	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Relevant provisions of ***legislation and code of practice relevant to the workplace*** and how they impact on business arrangements are explained. 1.3. Information on the organization's policies, procedures, programs and business arrangements are provided within the ***legal compliance*** context. 1.4. Information and ***documentation*** regarding legal compliance are evaluated and provided to the work group. 1.5. Approval of plans is obtained from relevant personnel.
2. Implement and monitor organization's procedures for the management of legal compliance	2.1 ***Legal compliance management systems*** and procedures are implemented and monitored to maximize compliance opportunities. 2.2 Legal compliance requirements are searched for, identified, reviewed and reported regularly so issues may be raised and dealt with in a prompt and appropriate manner. 2.3 Adequate ***resources*** have been allocated are identified and periodically reviewed to implement legal compliance and inform appropriate parties promptly. 2.4 Ensure all members of the workgroup have the opportunity to contribute to issues on legal compliance and ensure. 2.5 Information is stored and reviewed within the organization.
3. Implement,	3.1. Information on legal compliance is collected and reviewed

monitor and prioritise compliance requirements within organizational procedures	and any existing or potential non-compliance issues reported so they can be addressed appropriately. 3.2. Compliance information is evaluated and clarified to all relevant personnel. 3.3. Implications of non-compliance are identified. 3.4. Legal compliance requirements are grouped into critical, important and incidental classifications so that non-compliance issues can be prioritized and appropriate ***measures*** are implemented to prevent or minimize reoccurrence of non-compliance.
4. Implement, monitor and document procedures and training for compliance requirements	4.1. Documentation on training needs and workplace procedures is identified, implemented, monitored and provided to ensure compliance. 4.2. ***Legal compliance measures*** are monitored and reported to relevant personnel to ensure legal compliance is part of the organization's general training program. 4.3. Appropriate legal compliance training programs are implemented in ***consultation*** with relevant personnel. 4.4. Inadequacies in existing legal compliance measures and resource allocation are identified and reported to ***management***.
5. Implement and monitor procedures for maintaining legal records and for dealing with non-compliance events	5.1. Workplace procedures are implemented to deal with non-compliance events in a timely manner while keeping ***accurate legal records***. 5.2. The cause of non-compliance events is identified and investigated using the work areas records in accordance with investigation procedures. 5.3. Recurrence of non-compliance is minimized by using systems for reporting maintenance of legal compliance.

Variable	Range
Compliance documentation	may include: • organization and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • award and enterprise agreements and relevant industrial instruments • relevant legislation from all levels of government that affects business operation, especially in regard to:

	➢ OHS ➢ environmental issues ➢ industrial relations • relevant industry code of practice
Legal compliance	May include: • waterways • workers compensation/work cover • planning and assessment • local government • licensing requirements • duty of care • environmental • industrial relations • navigation • EHS Management System • policy • standards • procedures • databases • decision making • reviews • conventions • making permanent changes • maintenance of records of legal breaches • provision of information and training • regulations and code of practice relating to legal compliance • site representatives and committees • issue resolution • business registration • license to practice • industrial • fire • superannuation • partnership agreement • insurance • constitution documents • Acts • tender documents • financial documentation • development and implementation of compliance training measures

Documentation	May include: • legislation • code of practice • organization's policies/procedures • statutory and regulatory requirements • legal compliance
Legal compliance management systems	May include: • work schedules - shift work and varying hours of duty • environments from simple to complex and diverse • appropriate policies, guidelines and processes • autonomy, from limited to substantial • quality and continuous improvement processes and standards • business plans • performance plans • ethical standards established by the organization • productivity and profitability objectives and targets • best practice and benchmarking principles • legislation, codes and practices • resource parameters which may be defined or negotiated • training and development principles and practices • human resource policies and practices including: ➢ interviewing ➢ counseling ➢ dispute resolution ➢ discipline
Resources	May include: • Acts • legislation/regulations • information • Common Law • the community
Legal compliance measures	May include: • development of training programs • implementation of training programs
Consultation	May include with: • regulatory authorities • tenderers • project managers • contractors • employees • community • customers

	• suppliers
Management	May include: • leader/coach • facilitator • mentor • participant • director • trainer • assessor
Accurate legal records	May include: • statutory/legal records • training needs • resource allocation • OHS • financial • personnel • taxation

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for identifying, implementing and maintaining legal compliance requirements • implementation of procedures and techniques for the safe, effective and efficient identification, implementation and maintenance of legal compliance requirements • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of legal compliance requirements that best meet the required outcomes • working with other to undertake and complete the identification, implementation and maintenance of legal compliance requirements • consistent successful identification, implementation and maintenance of legal compliance requirements
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legal compliance rights • environmental compliance requirements • compliance insurance requirements • contractual rights and responsibilities • record-keeping systems required for compliance management • complaints handling systems

	• continuous improvement processes for compliance including: ➢ monitoring ➢ reporting ➢ evaluation ➢ review • relevant organization policies and procedures • policies in various compliance areas • organizational standards for operations and ethics
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for identification, implementation and maintenance of legal compliance requirements • maintain legal and organizational compliance procedures and policies • use effective consultative mechanisms to negotiate compliance processes and procedures appropriate to statutory/legal requirements • explain complex compliance information to relevant personnel • provide coaching and mentoring support to encourage compliance • read, interpret and apply compliance legislation • relate to people from a range of social, cultural and ethnic backgrounds • source information on compliance requirements • Organize and review information on compliance requirements
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement Emergency Preparedness and Response Systems**
Unit Code	**MIN MPR5 03 0114**
Unit Descriptor	This unit covers the implementation of emergency preparedness and response systems in resources and infrastructure industries. It includes planning and preparing for implementing site procedures, implementing site procedures and post-incident management procedures, and auditing the procedures.

Elements	Performance Criteria
1. Plan and prepare for implementing site procedures	1.1. ***Compliance documentation*** relevant to emergency preparedness and response implementation is accessed, interpreted and applied. 1.2. The ***emergency preparedness and response system*** are accessed, interpreted and clarified. 1.3. Roles and responsibilities are identified, clarified and ***communicated*** to all persons as specified in the established emergency preparedness and response procedures. 1.4. Resources required for the implementation of established emergency preparedness and response procedures are identified, forecasted, obtained and allocated/scheduled. 1.5. The emergency preparedness and response training program are implemented. 1.6. Suggestions and recommendations are encouraged, received, reviewed and implemented for changes to established emergency preparedness and response implementation procedures.
2. Implement site procedures	2.1. ***Incident*** information is received and communicated in accordance with established emergency preparedness and response procedures. 2.2. The nature and scope of the incident are assessed and communicated in accordance with emergency preparedness and response plans. 2.3. Relevant emergency plans are identified and implemented in accordance established emergency preparedness and response procedures. 2.4. Emergency response and evacuation plans and procedures in are implemented accordance with established emergency

	preparedness and response procedures. 2.5. ***Operations facilities*** are implemented for incident management in accordance with established emergency preparedness and response procedures. 2.6. Procedures are implemented for monitoring, recording and reporting on emergency incidents according to statutory requirements and those of established emergency preparedness and response procedures. 2.7. Procedures are implemented for the collection and analysis of emergency preparedness and response data. 2.8. Action plans developed to manage the situation/incident in accordance with emergency procedures. 2.9. Action plans are implemented in accordance with established emergency preparedness and response procedures. 2.10. ***Required services***, ***personnel***, ***equipment and resources*** are deployed to meet action plan. 2.11. Effectiveness of action plan is assessed and communicated to achieve required outcomes in accordance with established emergency preparedness and response procedures. 2.12. Incident information is communicated in accordance with established emergency preparedness and response procedures.
3. Implement post-incident management procedures	3.1. Contribute to plans to manage ***post-incident actions*** are in accordance with statutory and site requirements. 3.2. Post-incident action plans are implemented in accordance with established emergency preparedness and response procedures. 3.3. Contribute to investigations into the nature and cause of the situation/incident and submit relevant reports in accordance with established emergency preparedness and response procedures.
4. Audit procedures	4.1. Emergency preparedness and response systems and procedures are ***audited*** for compliance with statutory and emergency preparedness and response procedures requirements. 4.2. Emergency preparedness and response communication and recording systems are audited for compliance with established emergency preparedness and response procedures'

	requirements. 4.3. Emergency preparedness and response training program are audited for currency, relevance and compliance with established emergency preparedness and response procedures.

Variable	Range
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Emergency preparedness and response systems	is: • a documented system for the control of emergencies and the resources put in place as a requirement of this system, including but not limited to: ➢ hazard identification and quantification ➢ risk assessment ➢ authority and responsibility ➢ controls established to manage identified risks ➢ reporting and communication ➢ document control ➢ audit and review • They may include procedures for: ➢ workplace atmosphere monitoring ➢ ventilation systems and usage ➢ inertisation techniques ➢ site plans ➢ trigger action response plans ➢ emergency procedures ➢ training and education ➢ liaison with external agencies
Communications	May include: • radio • telephone • telemetry • verbal • written • computers • runners

Incidents	May include: • explosion • fire • roof fall • strata • inrush • outburst • irrespirable atmosphere • environmental incident • Hazchem • explosives • vehicle accidents • wall collapse • minor accident • major accident or fatality • underground explosion or fire • ignition • spontaneous combustion • surface fire which disrupts operations • bomb threat • terrorist attack • wind blast • failure of ventilation control devices/appliances
Operations facilities	May include: • operations centre • press room • mortuary • muster areas • meeting rooms • communications centres • networks
Required Services, personnel, equipment and resources	May include: • internet mine services and resources • contractors • insurance companies • suppliers • local community • manufacturers • inspectorate • police • mines rescue services

	• fire brigades • ambulance • medical staff • hospital • critical incident stress debriefing organizations • local emergency management organizations • salvation army • clergy • state • federal and local government • media • coroner's representative • security services • solicitors • district check inspector • other sites • engineers • scientists • inertisation • down-hole camera • drill rigs • forensic
Post-incident actions	May include: • legal advice • environmental aspects • Critical Incident Stress Debriefing • interviewing • investigations • witness interview statements • restoration of normal operations • media releases • public relations • employee welfare and family support • security of evidence • liaison with statutory/legal bodies • statutory investigations • review of emergency procedures • documentation of ongoing operations • restoration of emergency preparedness
Audit	is: • the process by which the validation of procedures, processes

	and systems are assured
Equipment	May include: • rescue equipment • mining equipment • transport • specialized equipment from external sources • monitoring and analysis equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the implementation of emergency preparedness and response systems • implementation of procedures and techniques for the safe, effective and efficient implementation of emergency preparedness and response systems • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of option that best meet the required outcomes • working with others to undertake and complete the implementation of emergency preparedness and response systems • consistent successful implementation of emergency preparedness and response systems
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • document control requirements • training and assessment principles • industry and legislative stakeholders • site incidents and risks • classification of incidents • legislative and statutory requirements for emergency preparedness and response systems • legislation applicable to sites • rescue guidelines • emergency response system design and functionality • emergency response planning processes and techniques • audit review process and techniques • site structure of emergency procedures guidelines • legal requirements of incident management teams • hazard identification • self-escape philosophies, systems and equipment

	• risk management principles and techniques • structure of emergency organizations • structure, roles, capabilities and limitations of external services and agencies relevant to emergency preparedness and response • intervention and control techniques for heating, fires, explosions, outburst, extrication or inrushes • the effects of heat and humidity • the effects of visibility development, administration and review of procedures that apply to the system • rescue team structure, procedures and equipment • escape strategies and technology • environmental risks and controls • equipment requirements for different types of emergency • ventilation and its influence on incidents • deployment of staff • procedure/policy for re-deployment of personnel underground after evacuation • call-out procedures • emotional effects of emergencies on rescuers and site personnel • titles and roles of members of incident management team • legal implications of incidents • the role of stakeholders • number of personnel needed to run the site at planned operational levels • equipment handling requirements and procedures • economic considerations and decisions • insurance policies and considerations • site closure procedures and the legislative implications • de-briefing processes • emergency incident management
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • access, interpret and apply technical information relevant to emergency preparedness and response • access and analyze emergency preparedness and response information related to the site • interpret and apply design criteria for emergency preparedness and response systems and plans • collect, collate and interpret incident/emergency data

	• apply fault-tree analyzes • apply procedures for conducting enquiries/investigations and prepare reports • communicate effectively in the workplace • conduct an incident de-brief • access, interpret and apply data from monitoring systems and equipment • operate hand held monitoring equipment • apply procedures to implement the emergency preparedness and response training program • apply risk management processes and techniques
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement Systems and Methods of Mining**
Unit Code	**MIN MPR5 04 0114**
Unit Descriptor	This unit covers the implementing of systems and methods of mining in the mining industry. It includes: planning and preparing for, implementing, auditing and reviewing the effectiveness of the design system.

Elements	Performance Criteria
1. Plan and prepare for design systems	1.1. ***Compliance documentation*** relevant to the implementing of systems and methods of mining is accessed, interpreted and applied. 1.2. The ***design*** system documentation is accessed, interpreted and clarified. 1.3. The roles and responsibilities are identified, clarified and communicated as specified in the design system. 1.4. Work group, individual responsibilities and tasks are communicated and clarified. 1.5. ***Resources*** required for the implementation of the design system are identified, forecasted and recorded. 1.6. The program is implemented to satisfy identified design system training requirements. 1.7. The ***risks*** associated with unstable mining structures are identified and interpreted. 1.8. Safe ***operating procedures*** are accessed and interpreted.
2. Implement the design system	2.1. Primary, secondary and other support ***systems*** are communicated in accordance with the design system. 2.2. Mining sequences are implemented and communicated in accordance with the design system. 2.3. Resources are obtained and allocated in accordance with the design system. 2.4. The design system training requirement is implemented. 2.5. A maintenance program is implemented in accordance with the design system. 2.6. A monitoring system is implemented in accordance with the design system.

	2.7. Reporting and recording systems are implemented in accordance with the design system. 2.8. Implementation procedures are monitored to ensure compliance with the approved plan. 2.9. Emergency and evacuation plan and procedures are implemented.
3. Audit and review the effectiveness of the design system	3.1. ***Stable structure*** controls are ***audited*** for compliance with statutory and design system specifications. 3.2. Stable structure standards are audited for compliance with statutory and site requirements. 3.3. Monitoring systems are audited for compliance with statutory and design plan standards. 3.4. Recording and reporting systems are audited for compliance with statutory and site requirements. 3.5. System maintenance program and procedures are audited for compliance with statutory and site requirements. 3.6. The design training program is audited for currency, relevance and compliance with the design plan. 3.7. Emergency and evacuation plan and procedures are audited for compliance with site requirements.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Mine design	is the process of engineering analysis applied to the systems and sequences involved in mining and may include: • in whole or in part footwall and hanging wall competency requirements relating to mine plant • mining induced stress • ventilation • tunnels • sequencing • drives • stone drivage

	• shaft sinking • pillar extraction • partial extraction • punch mining • modeling • ore grades • geology • fault management • fault drivage • roof and floor technical data • over and underlying strata • footwall and longwall subsidence • maintenance strategies and plans • legislative and statutory requirements
Resources	May include: • skilled personnel • rock mechanics underground mine supports and equipment • power water/gas drainage systems • budgetary requirements
Risk	is defined as: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Operating procedures	are also known as: • safe working procedures, safe operating procedures and standard working procedures
Mining systems	May include: • bord and pillar • rock casing • open stopping • overhead • underhand • outfill • glory hole • place changing • auger mining • pillar extraction and extraction • partial extraction • punch mining • systems of entry
Stable structure	May include:

controls	• roadway size • pillar sizes • depth of cover and underlying/overlying strata • stress regimes • underground opening characteristics • water ingression • systems of mining • breaker line supports • direction of mining
Audit	is: • the validation process to ensure the system, procedures and processes meet the established objectives and are implemented

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the implementing of systems and methods of mining • implementation of procedures and techniques for the safe, effective and efficient implementation of systems and methods of mining • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of systems and methods of mining that best meet the required outcomes • working with others to undertake and complete the implementation of systems and methods of mining • consistent successful implementation of systems and methods of mining
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements for mining structures including mine plans, ventilation, gas monitoring, strata support and safety management plans • the systems of mining including tunnels, drifts, stone drivage, shaft sinking, pillar extraction, partial extraction, punch mining and fault drivage • stress including mining induced stress, vertical and horizontal stress tectonics • sedimentology including subsidence, water bearing strata, permeability of seam and strata, hydrology, physical property testing, caving characteristics, windblast, gas content and over and underlying strata

	• systems of work including bord and pillar, place changing, rock casing, open stopping, outfill, auger mining, pillar extraction, partial extraction and punch mining • mining structure failure modes • development, administration and review of procedures that apply to the system • exploration techniques • geology and mine gas characteristics • stable mining systems design and functionality • mining engineering principles • lithology • ground support systems • audit methodologies • mine site historical information • limitations and controls
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply exploration techniques • apply mining constraints • access, interpret and apply technical information relating to mine management • access and analyze archival and historical mine management information related to the mine and failure mode of mine structures • interpret and apply design criteria for mine management • communicate effectively in the workplace • apply [procedures for preparing operating procedures relating to mine management • conduct and report on audits • identify and evaluate geological and geotechnical information
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement and Maintain Management Systems to Control Risk**
Unit Code	**MIN MPR5 05 0114**
Unit Descriptor	This unit covers the implementation and maintenance of management systems to control risk in resources and infrastructure industries. It includes developing the framework for and processes to support site risk management systems; planning and implementing risk management systems; and monitoring, reviewing and updating risk management processes.

Elements	Performance Criteria
1. Develop the framework for the site risk management system	1.1. ***Compliance documentation relevant*** to implementing and maintaining management systems is accessed, interpreted and applied to control risk. 1.2. Site objectives in the ***area of managerial responsibility***, are developed and documented in consultation with relevant personnel, and conforming to the organization's ***policy*** and ***system's procedures***. 1.3. The structures are developed and documented for the application of the management system, in consultation with relevant personnel. 1.4. The responsibilities are defined, allocated and documented for applying the management system in job descriptions and duty statement for all relevant site positions.
2. Develop the processes to support the site risk management system	2.1. Existing and potential site ***hazards*** *and* ***risks*** in the area of managerial responsibility are ***identified*** from site inspection and trends identified from the record system. 2.2. The organization's criteria is accessed, interpreted and clarified for assessing and ***treating risks***. 2.3. Detailed ***site procedures and practices*** are developed and documented for the application of the management system in ***consultation with relevant personnel***. 2.4. Information sources and expert advice required to support the management system are identified, obtained and maintained.
3. Plan and implement the	3.1. How the management systems will be introduced are planned, scheduled and documented to the entire work site.

risk management system	3.2. ***Resources are*** identified, sought and/or provided for the operation of the management system, in a timely and consistent manner. 3.3. Information on the site management system is provided and explained in a form readily accessible to site employees. 3.4. Appropriate development and/or training is/are provided or arranged for site personnel on the risk management systems' site procedures and practices. 3.5. Available information on known and intended process changes and enhancements is made to ***site personnel***. 3.6. Support and encouragement are provided to those responsible for the detailed system activities. 3.7. Ensure all management systems' ***records and reports*** *are* produced, processed and maintained.
4. Monitor, review and update the risk management processes	4.1. The management systems' activities and achievement targets are ***monitored*** and resources provided/ focused to ensure the implementation plan is satisfied. 4.2. The management systems' implementation plan is reviewed and updated periodically and when changing circumstances are anticipated or occur. 4.3. ***Management system documentation*** including the reasons for and changes made to the system are completed and retained.

Variable	Range
Relevant compliance documentation	may include: • legislative, organization and site requirements and procedures • manufacturer's guidelines and specifications • Relevant Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
The areas of managerial responsibility	covered by this may include: • statutory compliance • occupational health and safety • environment • quality

	• property security • business risks, such as: ➢ credit management ➢ capital expenditure ➢ sales and marketing ➢ finance and accounting
The policy	is: • the statement of overall intent and direction of the organization in respect of the specific area of managerial responsibility
The system's procedures	are: • the procedures that support and expand on the policy and set out the requirements for implementing the system on individual sites. They provide direction and guidance to those responsible for implementation of the system and in the preparation of site-specific work procedures, instruction and practices to put the system into effect
System's procedures	may include: • identification of hazards • risk identification • risk assessment • risk treatment • interim solutions • dealing with unplanned incidents and events • consultation • communication • monitoring • review • record keeping • reporting • training
Hazards	are: • sources of potential harm or situations with the potential to cause loss
Risk	is: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequence and likelihood
Risk identification	is: • the process of determining what can happen, why and how
Risk treatment	is: • the selection and implementation of appropriate options for

	dealing with risk should: • considered using options in sequence from eliminating the hazard, substitution, engineering controls, administrative controls, and finally PPE
Site procedures and practices	may include: • standard operating procedures • safe operating procedures • work instructions • emergency procedures • allocation of responsibilities • permit requirements • sampling, testing and worksite inspection requirements • documentation and reporting requirements
Consultation with relevant personnel	Would typically include: • senior management • subject matter experts • regulatory authorities • tenderers • project managers • contractors • employees • community • customers • suppliers
Resources	may include: • people • finance • equipment • buildings/facilities • technology • information
Site personnel	may include: • employees • contractors
Records and reports	may include: • results • recommendations • assessment forms • action planning documents, etc
Monitor	is: • to check, supervise, observe critically, or record the progress

	of an activity, action or system on a regular basis in order to identify change
Management systems documentation	may need to include: • requirements for the maintenance of records for statutory/legal breaches • provision of information and training • regulations and code of practice relating to statutory/legal compliance • site representatives and committees • issue resolution

Evidence Guide	
Critical Aspects of Competence+	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the implementation and maintenance of management systems to control risk • implementation of procedures and techniques for the safe, effective and efficient implementation and maintenance of management systems to control risk • the identification of the relevant information and scope of the work required to meet the required outcomes • working with others to undertake and complete the implementation and maintenance of management systems to control risk • consistent successful implementation and maintenance of management systems to control risk
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • relevant legislative requirements • roles and responsibilities of relevant personnel within the organization • action planning methods • human resource management processes • method of identifying appropriate action based on cost, safety, and welfare issues • work procedure and instruction documentation requirements • reporting and recording procedures • work site operating procedures • hazard identification processes • risk assessment processes • risk treatment processes • documentation methods
Underpinning Skills	Must demonstrate skills to:

	• apply legislative, organization and site requirements and procedures to implement and maintain management systems to control risk • develop and maintain site procedures and practices • read, interpret, apply and communicate technical information, rules, procedures, regulations • document and facilitate management planning • maintain relevant records and documents • monitor and decide on changes to process • provide leadership and guidance for group activities • explain complex information to superiors/subordinates • provide coaching and mentoring support • apply active listening • apply negotiation skill • apply sensitivity to the needs and feelings of others • actively encourage the free exchange of information
Resources Implication	Assessment is required to real or appropriate simulated situations, including work areas, materials and equipment, & information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration and Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Manage Blast Hole Drilling Operations**
Unit Code	**MIN MPR5 06 0114**
Unit Descriptor	This unit covers managing blast hole drilling operations in resources and infrastructure industries. It includes preparation for, planning for and the implementation, monitoring and adjusting of blast hole drilling operations.

Elements	Performance Criteria
1. Prepare for blast hole drilling operations	1.1. ***Compliance documentation*** relevant to managing blast hole drilling operations is accessed, interpreted and applied. 1.2. The ***geological*** *and* ***survey data*** relevant to the planning and implementation of ***blast hole drilling*** operations are confirmed. 1.3. ***The blast design parameters*** relevant to the planning and implementation of the blast hole drilling operations are accessed, interpreted and clarified.
2. Plan the blast hole drilling program	2.1. ***Internal and external stakeholders*** are involved in the ***planning*** process in a way that uses their contribution effectively and gains their support for the outcomes. 2.2. ***Source of the equipment*** to be used for the safe, effective and efficient implementation of the blast hole drilling program is ***selected and identified***. 2.3. The blast hole drilling program is developed and documented in accordance with the blast design parameters, the confirmed geological and survey data and relevant requirements and procedures. 2.4. The ***resource*** required for the implementation of the blast hole drilling is identified and acquired. 2.5. Any ***training*** required for personnel involved in the pit operations is identified and arranged. 2.6. The blast hole drilling program budget is prepared and presented in accordance with requirements.
3. Implement, monitor and adjust the blast hole drilling program	3.1. The blast hole drilling program is issued and explained to team members and others involved, for the safe, effective and efficient implementation of the program. 3.2. Ongoing support and advice to those implementing the blast hole drilling program are provided timely.

	3.3. Ensure that the blast pattern is correctly marked out in accordance with the blast design. 3.4. Ensure records and reports are maintained and issued in accordance with the pit development requirements and other relevant requirements. 3.5. The blast hole drilling program and its performance are monitored against blast design parameters, the budget and other relevant requirements. 3.6. Anomalies are resolved in consultation with relevant stakeholders and appropriate instructions issued for adjustments to the plan and/or its implementation.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Geological data	May include: • rock (or other resource) types and characteristics • faults and joints
Survey data	May include: • site and neighboring land form • site and neighboring boundaries and structures • site and neighboring roads and other infrastructure • approved limits of extraction • title details
Blast hole drilling	May include: • auger • solid flight • rotary air • down hole hammer • rotary air blast • top hole hammer
Blast design parameters	May include: • blast hole pattern (including burden and spacing and orientation) • blast hole diameters • blast hole depth

	• blast hole incline
Internal and external stakeholders	May include: • site and off-site employees • contractors • equipment suppliers • geologists, surveyors and/or draughts persons • regulatory authorities representatives • community representatives • site neighbors
Planning	May include: • flow-charts • Gantt charts • critical path networks
Selection and identification of the source of equipment	May include: • site geological factors • blasting parameters • production requirements • availability of organization's equipment • availability of contractors equipment • evaluation of drilling methods • evaluation of economics and efficiency • comparative costs of various options, which may include: ➢ ownership costs of drilling equipment ➢ operating costs of drilling equipment ➢ consumable cost of drilling ➢ total unit costs of a drilling operation
Resources	May include: • financial • labor • materials • services • plant and • equipment, which may include: ➢ down-hole tools such as tri-cone, button or cross bits ➢ drill rigs: ✓ drifter - hydraulic or pneumatic ✓ rotary top drive • ancillary equipment: ➢ pumps ➢ compressors ➢ generators

	• grout mixing equipment • diesel engines • vehicles
Training	May include: • hazards and potential accidents • driller's personal safety equipment • accident investigation and reporting • location • personal behavior • drilling operation • noise and dust • responsibility of key personnel • associated legislation and regulations
Safety considerations	May include: • faults in mechanical, electrical, hydraulic or other equipment • hazards related to drilling (e.g. explosion, drilling into butts, misfires) • drill rod handling • power lines • chemicals • care in used rod disposal • contaminants • toxic materials and gases • heat stress • climatic exposure • human error • lack of training • poor site preparation • non-use safety gear • ground slippage and geology • noise and dust • face stability • loose fitting clothing • bull hose • voids management • drilling into butts and misfires

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the managing of blast hole drilling operations • implementation of procedures and techniques for the safe,

	effective and efficient management of blast hole drilling operations • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of blast hole drilling options that best meet the required outcomes • working with others to undertake and complete blast hole drilling operations • consistent successful blast hole drilling operations
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures • geological data • survey data • blasting parameters • pit development options and procedures • operational techniques required for execution of the plan • plant and equipment capabilities • work planning techniques • team leadership techniques • consultative and coaching techniques • work monitoring methods • recording and reporting systems • drilling operations • drilling products and services • drilling plant and equipment • team management • organizational objectives • resource monitoring • surveying • financial models • fundamentals of contract law • human resource management • industrial awards/enterprise agreements • planning processes • risk management: principles, strategies and applications • customer/client relations • environmental management • OHS • computer applications • negotiation techniques • plan presentation

Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • interpret and apply legislative and organizational requirements • interpret and apply geological and survey data • provide team leadership • manage people and processes • resolve conflict • coordinate human, financial and physical resources • choose appropriate operational techniques • choose and assign appropriate plant and equipment • develop, initiate and administer work plans • interpret and apply operational performance data • monitor and maintain drilling operations • prepare operating budgets and forecast trends • manage projects and tasks • deliver and maintain products and services to required specifications • manage drilling traffic • evaluate new and used equipment using appropriate techniques • control operating costs • performance auditing of finance, energy, safety, environment, quality assurance, human resources, legislative compliance and benchmarking • gain statutory/legal approvals • prepare tender specifications • negotiate and finalize contracts • access and use appropriate technologies • prepare and present management reports • negotiate with internal/external customers, community and statutory/legal authorities • read, analyze and update plans
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Manage, Operate and Maintain the Mine Ventilation System**
Unit Code	**MIN MPR5 07 0114**
Unit Descriptor	This unit covers the management, operation and maintenance of the mine ventilation system in the resources and infrastructure industries. It includes identifying, analyzing and evaluating hazards and risks associated with the mine ventilation system and ventilation control options and measures. It also includes contributing to the development and maintenance of the mine ventilation management plan, implementing mine ventilation monitoring, recording and reporting systems and coordinating and controlling the maintenance of and changes to, the mine ventilation system.

Elements	Performance Criteria
1. Identify, analyze and evaluate hazards and risks associated with the mine ventilation system	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. The sources, hazards and risks of ***gases*** and fumes are identified, analyzed and evaluated. 1.3. The likelihood and risks of ***spontaneous combustion*** are identified and evaluated. 1.4. The hazards and risks of ***airborne*** and flammable dust are identified, analyzed and evaluated. 1.5. The potential for the likely impact of wind blast and ***outburst*** on the ***ventilation system*** are identified, analyzed and evaluated. 1.6. The ***impacts of fire***, ***ignition and explosion*** on the ventilation system are identified, analyzed and evaluated. 1.7. The potential is identified, analyzed and evaluated for the impact of the ***ventilation pressure differentials***. 1.8. The effect of changes is identified, analyzed and evaluated in air ***temperature and humidity***. 1.9. The causes and effects of ***re-circulation*** are identified, analyzed and evaluated. 1.10. The impact associated with disruption to the ventilation system is identified, analyzed and evaluated. 1.11. The impacts of holing into previous workings are identified, analyzed and evaluated.

2. Identify, analyze and evaluate ventilation control options and measures	2.1. The types, applications and limitations of the ***ventilation control devices*** are identified, analyzed and evaluated. 2.2. The ***impact of mine design on ventilation system*** is identified, analyzed and evaluated. 2.3. The methods, purposes and limitations of mine ***monitoring*** systems and processes are identified, analyzed and evaluated. 2.4. ***Inertisation techniques*** and applications are identified, analyzed and evaluated. 2.5. The impact of seam gas management on the ventilation system is identified, analyzed and evaluated. 2.6. The impact of water management on the ventilation system is identified, analyzed and evaluated.
3. Contribute to the development and maintenance of the mine ventilation management plan	3.1. The objectives and criteria for safe and effective ventilation are identified, analyzed and confirmed. 3.2. The principles and requirements of mine ventilation are incorporated into the mine development plan. 3.3. The requirements are identified, analyzed and evaluated for mine ***fans*** and appropriate selections made. 3.4. Design criteria and specifications are evaluated and applied for ventilation networks and individual circuits. 3.5. Ventilation control device options are evaluated against requirements and best option is selected. 3.6. Design criteria are established for ventilation and environmental monitoring systems and appropriate selections are made. 3.7. Procedures are prepared for the installation, establishment and operation of ventilation management systems and incorporated into the ***ventilation management plan***. 3.8. A system is developed for early warning for each identified hazard including ***action*** requirements for each event and incorporated into the ventilation management plan. 3.9. ***Maintenance*** program and procedures are formulated and implemented as part of the ventilation management plan. 3.10. Procedures for the ***audit,*** review and updating of the

	ventilation system are incorporated into the ventilation management plan. 3.11. ***Ventilation training*** requirements are identified and incorporated into the ventilation management plan.
4. Implement mine ventilation monitoring, recording and reporting systems	4.1. Procedures are implemented for monitoring, recording and reporting on the ventilation system according to statutory requirements and those of the ventilation management plan. 4.2. Procedures are implemented for the installation and operation of monitoring systems and equipment. 4.3. Procedures are implemented for the collection and analysis of ventilation data. 4.4. Monitoring system data is processed, recorded and reported in accordance with the requirements of the ventilation management plan. 4.5. Measured data is interpreted and compared with statutory requirements and those stipulated by the ventilation management plan and action requirements implemented. 4.6. The periodic review of ***alarm*** settings and alarms raised in the ventilation management plan is included and implemented.
5. Coordinate and control the maintenance of and changes to the mine ventilation system	5.1. The ventilation system maintenance program is reviewed, confirmed and communicated to responsible parties. 5.2. Maintenance activities, including inspections, repair and maintenance are coordinated. 5.3. The system of recording and reporting maintenance requirements and activities is implemented. 5.4. Changes are planned, controlled and implemented to the ventilation system. 5.5. Mine ventilation plans are prepared and maintained in accordance with statutory requirements and mine standards.
6. Audit and review the effectiveness of the mine ventilation system	6.1. The effectiveness of the ventilation system is audited in accordance with the ventilation management plan. 6.2. Ensure that ventilation control devices are complied with statutory and ventilation management plan requirements. 6.3. Ensure that ventilation standards are complied with

	statutory and ventilation management plan specifications. 6.4. Mine monitoring systems are operated. 6.5. Ventilation recording systems are maintained accurately and data is processed. 6.6. Ventilation system maintenance program and procedures are implemented and recorded. 6.7. The content of the ventilation management plan is communicates to the workforce and ensures that it is understood. 6.8. The ventilation system is reviewed in accordance with the ventilation management plan. 6.9. Ensure that the emergency plans are made consistent with the ventilation management plan. 6.10. Ensure that the ventilation standards are remained appropriate. 6.11. Ensure that the training of mine employees is made current, relevant and is conducted. 6.12. Future ventilation requirements are identified, assessed and incorporated into the ventilation planning procedures.

Variable	**Range**
Relevant compliance documentation	may include: • organization and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • award and enterprise agreements and relevant industrial instruments • relevant legislation from all levels of government that affects business operation, especially in regard to: ➢ OHS ➢ environmental issues ➢ industrial relations • relevant industry code of practice
Gases	may include: • seam gases or gases from other introduced sources and may include: ➢ methane ➢ carbon dioxide ➢ carbon monoxide

	➢ oxides of nitrogen ➢ hydrogen ➢ sulphur dioxide ➢ hydrogen sulphide ➢ hydrocarbons ➢ contaminations
Spontaneous combustion hazards	may include: • potential ignition sources • flammable gases • fire • explosion • irrespirable atmosphere • noxious atmosphere • smoke • roof collapse • reversal of ventilation • water/gas • mechanisms which contribute to spontaneous combustion and may include: ➢ coal seam characteristics ➢ ventilation pressure difference ➢ mining system ➢ mine design ➢ humidity ➢ temperature ➢ moisture • physical spontaneous combustion indicators may include: ➢ smoke ➢ haze ➢ sweating ➢ smell ➢ temperature • gaseous spontaneous combustion indicators may include: ➢ carbon monoxide ➢ hydrogen and hydrocarbons ➢ indicator ratios such as: ✓ CO make ✓ Graham's radio ✓ other ratios as determined suitable
Airborne contaminants	may include: • respirable and combustible dust

Outburst hazards	may include:
	• ejection of materials
	• asphyxiant
	• toxic or flammable gas mixtures
	• entrapment
	• roof falls
	• ventilation disruption
	• mechanisms which contribute to an outburst may include:
	  ➢ maceral composition
	  ➢ depth of cover
	  ➢ gas content and composition
	  ➢ porosity
	  ➢ permeability
	  ➢ geology
	  ➢ stress
	  ➢ mining rate
	• outburst detection methods may include:
	  ➢ geological mapping
	  ➢ long-hole drilling
	  ➢ gas sampling
	  ➢ micro-seismic detection
	  ➢ changing face conditions and gas emission rates
	• outburst amelioration measures may include:
	  ➢ pre-drainage
	  ➢ methods of work

Ventilation system	is:
	• one which covers all the mine workings, including waste and sealed areas, and it includes all surface and underground fans and ventilation devices which control or impact on the mine ventilation
	• methods of ventilation may include:
	  ➢ exhaust/force
	  ➢ antitropal
	  ➢ homotropal
	  ➢ flank returns
	  ➢ ascensional/decensional
	  ➢ bleeder
	  ➢ ZUY systems
	  ➢ other combinations

Fire	• solid • liquid • gas • metals

Impacts of fire, ignition and explosion	may include: • contaminants • altered ventilation pressures/flows • direct physical impacts • complete disruption to the ventilation system
Ignition	is: • the rapid chemical reaction of a combustible material with oxygen when exposed to sufficient heat • ignition sources may include: ➢ electrical ➢ friction ➢ contraband ➢ spontaneous combustion ➢ naked flame ➢ chemical ➢ explosives
Explosion	is: • the sudden release of energy generated from the confinement of the rapid volumetric expansion of an ignition
Ventilation pressure differentials	May include those resulting from: • changes in barometric pressure • fall of ground • fan changes/failure • ventilation control devices changes/failure • outburst • holing into previous workings • re-circulation • ventilation circuit changes • natural ventilation pressure changes • explosions • changes in ambient temperature/humidity • fires • equipment moves
Temperature and humidity	May by impacted by: • climatic conditions • ventilation quantities • location of workplaces • mine layout and design • location of mine entries • depth • adjacent strata type • seam gas composition

	• sources of heat/humidity may include: ➢ strata ➢ equipment ➢ oxidation ➢ fire/spontaneous combustion ➢ auto compression ➢ exothermic chemical reactions ➢ seam moisture content
Re-circulation causes	May include or be related to: • the underground auxiliary/booster fans • scrubber systems • leaking ducts • failure or poor design of ventilation system • ventilation velocity pressures • natural ventilation pressures • gas densities • layering and wind blast • effect of re-circulation may include: ➢ build up of contaminant concentration (gas, dust, heat) ➢ decrease in oxygen
Ventilation control devices	may include: • doors • regulators • seals • stopping • air crossings • bulk heads • goaf seals • pressure chambers • other control device to control or direct ventilation flows in a mine • factors which impact on the selection of ventilation control systems may include: ➢ the life of the installation ➢ ground conditions (stress/heave) ➢ operating duty (pressure/quantity) ➢ mining method ➢ design ➢ explosion rating ➢ statutory requirements ➢ water ➢ seam gas (make/composition)

	• criteria for safe mine ventilation may include: ➢ statutory and regulatory requirements ➢ mine ventilation management plan ➢ measures to reduce and/or control seam gas ➢ introduced gas, fumes and dust ➢ temperature/humidity and maximum/minimum velocity specifications ➢ criteria for ventilation efficiency • defects to ventilation devices may include: ➢ inferior design ➢ deterioration of materials ➢ inadequate quality of construction ➢ physical damage ➢ water damage
Impact of mine design on the ventilation system	May be related to: • surface access • mining method/rate • barrier pillars and segregation of roadways • systems of mining • bleeder or back returns • number of headings • bleeders • geological features • principles of mine design include: ➢ reserve optimization ➢ mining direction ➢ geological structures ➢ ventilation ➢ strata control ➢ mining method ➢ productivity ➢ environmental considerations ➢ seam access
Monitoring	may include: • tube bundle • real time telemetry • portable (hand held) monitoring • bag samples • gas chromatography • fire monitoring • condition monitoring of ventilation devices • design criteria for fixed monitoring systems/equipment may include:

	➢ contingency for power outage ➢ alarms for process faults including PC/PLC failure ➢ analyzer/sensor failure ➢ communication failure ➢ alarm system latching ➢ alarm system fail-safe requirement ➢ alarm/sensor likely gas matrix determination requirement ➢ required ranges and accuracies ➢ provision for calibration ➢ statutory compliance ➢ surface analyzers combined gas monitoring capabilities ➢ logistic and maintenance support • design criteria for portable monitoring equipment may include: ➢ battery capacity (full shift) ➢ battery recharge requirements ➢ statutory compliance ➢ required ranges and accuracies ➢ provision for calibration ➢ size ➢ weight ➢ light facility ➢ ease of operation ➢ robust construction
Inertisation techniques	may include: • pressure swing absorption • natural oxidation • evaporative and pumped liquefied inert gas • seam gas • exhaust gases (Thomlinson Boiler or jet engine) • water • inertisation may be defined as the displacing or reducing of oxygen to a level that will not support combustion. It may be either a natural process using seam gases or a process of introducing inert gases
Fans	may include: • axial flow • centrifugal • fan design considerations may include: ➢ types ➢ mine layout ➢ user requirements and fan laws ➢ characteristics

	➢ duty control (speed/variable pitch) ➢ configuration (parallel/series) ➢ explosion/protection doors ➢ dampers ➢ auxiliary drive ➢ restart procedures ➢ maintenance requirements
Ventilation training	may include: • include induction • basic miner • deputy and ventilation systems operators/special requirements
Alarm	May include those for: • gas concentration/make • spontaneous combustion (physical and gaseous) • combustion indicators • condition monitoring for fans (vibration/temperature/current/failures) • ventilation devices • monitoring hardware
Mine atmosphere	Refers to: • all areas in the general mine ventilation district and beyond into waste working goafs/gobs in the mine
Geological conditions	may include: • faults • dykes • intrusions • strata deformities
Coal seam characteristics	May include inherent factors such as: • rank • petrology • moisture • cleat • coal hardness • seam gas • friability • pyrites or depositional factors such as*:* ➢ seam thickness ➢ multiple and rider seams ➢ seam dip ➢ depth of cover
Mining systems	may include:

	• longwall • main gate or single entry • board and total or partial pillar • pillar extraction methods
Analytical and interpretive tools	may include: • Ellicott diagrams • Cowards triangle • fire-gas ratios • gas makes • trending • fan laws • airway resistance • network analysis • computer simulation • gas laws • psychrometry • ventilation laws
Surveys	may include: • pressure/quality/temperature survey and gas dust survey
Disruptions to ventilation circuits	May result from changes in: • barometric pressure • fall of ground • ventilation device changes/failure • outburst • holing into previous workings • re-circulation • ventilation circuit changes • natural ventilation pressure changes • failure (planned) unplanned • explosions • changes in ambient temperature/humidity • fires • equipment moves

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for management, operation and maintenance of the mine ventilation system • implementation of procedures and techniques for the safe, effective and efficient management, operation and maintenance of the mine ventilation system

	• the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options for the management, operation and maintenance of the mine ventilation system that best meet the required outcomes • working with others to undertake and complete the management, operation and maintenance of the mine ventilation system • consistent successful management, operation and maintenance of the mine ventilation system
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • geological features and conditions on ventilation including faults, dykes, intrusions and strata deformities • impact of coal characteristics and coal seam gradients on mine ventilation design • effects of ventilation on the spontaneous combustion risk • mine gases; the types and their characteristics, sources, physiological effects and methods of detection • dust and other particulate matter; the types, sources, physical and physiological effect, and control/mitigation methods • mine fires; the types, sources of ignition, possible effects on the ventilation circuit and prevention/control/mitigation methods legislative and statutory requirements for ventilation including air quality, maximum values, control and distribution, flammable gas limits, ventilation fans, gas monitoring, dust limits and inspections and recording/reporting • methods of mine ventilation and their applications/limitations including exhaust/force, antitropal, homotropal, flank returns, ascensional/decensional, bleeder, ZUY systems and other combinations • methods of panel ventilation and their applications/limitations including homotropal and antitropal (and in conjunction with these, the use of goaf bleed or back return), auxiliary fans, coursed ventilation (narrow side/wide side), machine mounted scrubber systems, compressed air venturi and bleeders • impact of mining techniques and mine and panel design on ventilation • inertisation techniques and applications including pressure swing absorption, natural oxidation, evaporative and pumped liquefied inert gas, seam gas, exhaust gases (Thomlinson boiler or jet engine) and water • impact of differing • mine explosions; the types, ignition sources, possible effects

	on the ventilation circuits and prevention/control/mitigation methods • pressure changes; causes, the impacts on the ventilation system, responses (to include the causes and effects of natural ventilation and re-circulation) • heat, humidity; the sources and factors which may impact on mine ventilation and personnel • mine roadways and shafts; their design parameters and impact on mine ventilation • mine fans; fan laws, fan types, performance characteristics, configurations, applications and limitations • ventilation control devices; the types, purposes, design criteria and specifications, distribution/placement criteria and limitations • de-gassing; methods of control - including brattice, auxiliary fans, compressed air venturis, sails, hurdles and bleeders • ventilation networks and individual circuit design criteria, specifications and design processes • fixed ventilation monitoring systems types, uses/limitations , design criteria, specifications and design processes • portable monitoring equipment, types, uses/limitations, design criteria and specifications • the use of computer modeling and simulation techniques and applications relevant to mine ventilation planning; their functions, capabilities, advantages and limitations • computer-based systems for mine environment analysis • ventilation management plan development requirements and processes • ventilation surveys; the types, frequency and method for conducting including pressure/quantity/temperature and gas/dust • processes and techniques for determining alarms and trigger points/levels • audit and review processes and techniques • emergency response and disaster planning process and techniques • analytical and interpretive processes for gas mixtures and flammability including coward triangle, Ellicott diagram, gas make calculations and post explosion gases • applied ventilation theory including: ➢ Atkinson's equation ➢ methods of determining frictional resistance ➢ frictional resistance values for mine airways and ducts

	➢ psychrometry and heat ➢ gas laws including Charles, Boyle and Dalton ➢ air density calculations ➢ natural ventilation pressures ➢ static velocity total pressures and shock loss ➢ leakage ➢ duct leakage ➢ determination of mine resistance curves ➢ combining system resistance and fan curves ➢ regulator and equivalent orifice calculation ➢ determination of fan operating/duty points • Kirchoff's law
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for management, operation and maintenance the mine ventilation system • access, interpret and apply technical information • access and analyze archival and historical ventilation information related to the mine • interpret and apply mathematical and scientific theorems/laws related to ventilation • interpret and apply design criteria for ventilation systems and devices • interpret computer spreadsheets and ventilation modeling/simulations • collect, collate and interpret ventilation data • prepare technical procedures relating to ventilation • conduct enquiries/investigations and prepare reports • communicate effectively in the workplace • access data from monitoring systems and equipment • operate hand held monitoring equipment • analyze and report on ventilation training needs • apply risk management reports processes and techniques
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement, Monitor, Rectify and Report on Inventory Control System**
Unit Code	**MIN MPR5 08 0114**
Unit Descriptor	This unit covers the requirements to implement, monitor, rectify and report on inventory control system in the resources and infrastructure industries. It includes: implementing, monitoring, rectifying and reporting on inventory control system.

Elements	Performance Criteria
1. Implement inventory control system	1.1. ***Compliance documentation*** relevant to implementing, monitoring, rectifying and reporting on inventory control systems are accessed, interpreted and applied. 1.2. ***Resources***, both human and technical, required to support implementation are identified, and put in place. 1.3. ***Record keeping procedures*** are implemented. 1.4. ***Processes for controlling stock*** are implemented. 1.5. Reporting processes are implemented. 1.6. System is communicated to stakeholders.
2. Monitor inventory control system	2.1. ***Procedures*** are established for monitoring inventory control system. 2.2. Inventory control system is audited according to ***organizational*** specifications. 2.3. Discrepancy reporting procedures are implemented. 2.4. Production of inventory system reports is supervised. 2.5. Inventory reports are analyzed. 2.6. Major trends are identified. 2.7. Areas requiring adjustment are identified and documented and relevant personnel notified.
3. Rectify inventory control system	3.1. Procedures are developed for adjusting procedures and performance. 3.2. Modifications are undertaken to inventory control system according to organizational procedures. 3.3. Modifications are tested and further modifications made where necessary.

	3.4. Modifications are recorded and reported to relevant personnel.
4. Report on inventory control system	4.1. Results of inventory control are documented in accordance with organizational specifications. 4.2. Relevant parties are informed of the results of inventory control according to organization's guidelines.

Variable	Range
Relevant compliance documentation	May include • legislative, organization and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
Resources	Required include: • clerical / computer applications for maintaining records • technical support • data storage facilities
Record keeping procedures	Include: • requisition • purchasing • shipping • invoicing
Processes for controlling stock	Include: • inventory lists • stock lists
Organizational systems, policies and procedures	may include: • quality systems • standard operating procedures • standard work practices • organizational commitment • corporate policy • community consultation and involvement • objectives and targets • documentation and targets • documentation and records • responsibility and reporting structure • inventory review audits

	• supply and financial monitoring and measurement • organizational Code of Practice, Ethical Codes

Evidence Guide	
Critical aspects of Competence	Must demonstrate knowledge and skills competence to: • knowledge of the requirements, procedures and instructions to implement, monitor, rectify and report on inventory control system • implementation of procedures and techniques to safely, effectively and efficiently implement, monitor, rectify and report on inventory control system • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of pit plans that best meet the required outcomes • working with others to implement, monitor, rectify and report on inventory control system • consistently and successfully implement, monitor, rectify and report on inventory control system
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • site and equipment safety requirements • monitoring of documentation • auditing procedures • software characteristics, technical capabilities and limitations • reporting systems • archiving • record keeping procedures • sources of stock / inventory information • continuous improvement processes • work roles
Underpinning Skills	Demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply procedures for identifying and interpreting trends from inventory records • read, interpret and apply inventory information • apply diagnostic techniques • apply inventory system relationship to manufacturing process • apply inventory system recording and reporting requirements and procedures

	• apply records maintenance requirements • apply oral and written communication techniques • apply safe working practices • apply standard operating procedures
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement the Gas Drainage Management Plan**
Unit Code	**MIN MPR5 09 0114**
Unit Descriptor	This unit covers the implementation of gas drainage management plans in the mining industry. It includes planning and preparing for the implementation of the gas management plan, implementing the gas drainage management procedures, and implementing systems for the audit and review of gas drainage systems and equipment.

Element	Performance Criteria
1. Plan and prepare for the implementation of the gas management plan	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. The gas management plan is accessed, ***interpreted*** and clarified. 1.3. The gas management plan is identified and communicated to the relevant persons roles and responsibilities as specified 1.4. Resources required for the implementation of the gas management plan are identified, forecasted, scheduled and recorded. 1.5. Training needs are identified.
2. Implement the gas drainage management procedures	2.1. ***Hazard*** control procedures associated with the gas drainage management plan are implemented. 2.2. The gas monitoring and testing system installation, operation and ***maintenance procedures*** are implemented in accordance with site requirements. 2.3. The gas drainage service installation and recovery procedures are implemented. 2.4. The gas drainage system maintenance procedures are implemented. 2.5. The gas drainage management plan training requirements are implemented. 2.6. ***Action*** levels established to minimize the ***hazards*** of gas drainage are implemented. 2.7. Gas drainage management system information recording and reporting procedures are implemented.
3. Implement	3.1. Gas drainage monitoring systems are ***audited*** in accordance

systems for audit and review of gas drainage systems and equipment	with legislative and site requirements. 3.2. Recording and reporting systems are ***audited*** in accordance with legislative and site requirements. 3.3. Gas drainage installation, operation, maintenance and recovery procedures are audited. 3.4. The ***gas drainage management training*** plan is ***audited*** for currency, relevance and compliance with the requirements of the ***gas drainage management plan***. 3.5. Procedures are implemented for response to instances of non-compliance or other discrepancies/deficiencies revealed by ***audit***.

Variable	**Range**
Relevant compliance documentation	May include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Interpret	Is defined as: • the understanding needed by the person within their job role
Hazards	Is defined as: • a source of potential harm or a situation with a potential to cause loss May include: • irrespirable atmosphere • noxious atmosphere • flammable or explosive mixtures • outbursts • induced outburst • gas under pressure • location of drainage pipes • static electricity • damage to pipelines and other infrastructure • spontaneous combustion
Maintenance procedures	May include those for : • construction • action response • permit to work • condition monitoring

	• auditing • maintenance • document control • atmosphere monitoring • ventilation system control • communication systems • survey procedures • standard operating procedures • changes • training • recording/reporting
Audit	• is defined as a systematic examination against defined criteria to determine whether activities and related results conform to planned arrangement, and whether these arrangements are implemented effectively and are suitable to achieve the organization's policy and objectives
Gas drainage management training	Applies to: • mine workers • tradespeople • permanent employees • contractors • mine officials • other special requirements
Gas drainage management plan	Including: • hazard identification and qualification • risk assessment • authority and responsibility • controls established to manage identified risks • reporting and communication • document control • audit and review May include procedures for: • gas drainage drilling program • gas or geological anomaly detection • mine atmosphere monitoring • stimulation techniques • goaf seals • reporting requirements • auditing • ventilation systems and usage • mine plan • action plans

	• systems of mining • response plans • emergency procedures • individual and group responsibilities • training and education procedures
Risk	Is defined as: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Principles of mine design	Include: • recovery • reserve optimization • mining direction • geological structures • ventilation • strata control • mining method • productivity • environmental considerations • access
Standard Operating Procedures (SOPs)	are also known as safe working procedures, safe operating procedures and standard working procedures.
Mine atmosphere	refers to the atmosphere in all areas in the general mine ventilation district and beyond into waste working and goafs in the mine.
Mine gases	May include but not be limited to: • methane • carbon dioxide • carbon monoxide • oxides of nitrogen • hydrogen • sulphur dioxide • hydrogen sulphide • hydrocarbons • combinations
Ventilation systems	may include the use of: • main mine fan • auxiliary fans • brattice • regulators

	• seals • stopping • overcasts • ventilation doors • surface drainage boreholes • pressure chambers
Gas make characteristics	may include: • gas content • gas pressure • absorption • desorption • hydrostatic pressure • strata moisture content • permeability and porosity • tectonic stress
Gas drainage infrastructure	may include: • vacuum pumps • pipes • boreholes and stand pipes • gas separators and casing • surface installations • gas drainage plant including building • valves • hoses • water pumps • flame and lightening arresters • power supply to bore holes • cleaning equipment • air compressors • electricity and water services • pressure gauges • hydration plans
Alarm systems and action plans	may include those for: • gas concentration/make • combustion indicators • condition monitoring for fans (vibration/temperature/current failures) • ventilation devices • monitoring hardware • temperature alarms
Maintenance of the gas drainage	may include:

system	• inspection • servicing • repair

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for implementing the gas drainage management plan • implementation of procedures and techniques for the safe, effective and efficient implementation of the gas drainage management plan • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of gas drainage management plan elements that best meet the required outcomes • working with others to undertake and complete the implementation of the gas drainage management plan • consistent successful implementation of the gas drainage management plan
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and site requirements which may include those for gas drainage drilling, gas drainage installation and recovery, ventilation requirements, return airways gas levels, intake airway gas accumulated levels, gas control and distribution, environmental management, local government requirements, inspections and reporting • the methods of gas drainage and their applications/limitations against the mine design, mine and panel ventilation systems, systems of mining and current and future mine development • the impact of gas drainage on mining techniques, mine and panel design and production output • the impact of the strata geology and coal seam characteristics on the gas drainage management plan, including coal seam gradient, moisture content, friability, the porous features of the coal seam, stresses and intrusions • outburst mining monitoring procedures • drilling options and related equipment and techniques • hazard management processes and techniques • the effects of the type and quantity of gas in the coal seam • impacts of accumulation of coal dust after gas drainage has been completed • pressure changes; causes, the impacts on the ventilation

	system, and the effects on gas drainage • heat/humidity; the sources and factors which may impact on gas drainage and personnel • mine fans; fan laws, fan types, performance characteristics, configurations, applications and limitations in association with the gas drainage management plan, • ventilation control devices; the types, purposes, design criteria and specifications, distribution/placement criteria and limitations in association with the gas drainage management plan, • ventilation control devices; the types, purposes, design criteria and specifications, distribution/placement criteria and limitations • de-gassing; methods of control - including brattice, auxiliary fans, compressed air venturis, sails, hurdles, bleeders and purging • fixed gas drainage monitoring systems types, characteristics, uses and limitations • use of computer-based systems for mine environment and gas drainage systems analysis • Gas Drainage Management Plan development requirements and processes • gas drainage surveys; the types, frequency and method for conducting including pressure/quantity/temperature and gas • processes and techniques for determining alarms and trigger points/levels • audit and review processes and techniques • site document control requirements • emergency response and evacuation procedures • general uses and applications of ventilation theory, including: ➢ Atkinson's equation ➢ methods of determining frictional resistance ➢ gas laws, including Charles and Boyle ➢ natural ventilation pressures ➢ gas make ➢ leakage ➢ determination of mine resistance curves ➢ regulator and equivalent orifice calculation ➢ determination of fan operating/duty points ➢ Kirkoff's laws • mine operational procedures • strata control systems and their effects on gas drainage • mine and goaf ventilation systems

	• underground water management principles and systems • impacts of intersecting and intersected holes and hole design • site environmental monitoring requirements • legislative and mine reporting procedures
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for the implementation of the gas drainage management plan • access, interpret and apply: ➢ technical information ➢ site/legislative requirements ➢ geological information ➢ records and reports ➢ briefings and handover details • apply the principles of mine design • perform gas drainage planning mathematical calculations • access, evaluate and apply design criteria for gas drainage systems and devices • collect, collate and evaluate gas drainage data • establish technical procedures relating to gas drainage • conduct enquiries/investigations and prepare reports • assess the risks and consequences of gas drainage • develop procedures appropriate to mine operations for management of gas drainage • plan and coordinate work • identify training needs related to the gas drainage • operate hand held monitoring equipment
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement the Outburst Management Plan**
Unit Code	**MIN MPR5 10 0114**
Unit Descriptor	This unit covers the implementation of outburst management plans in the coal industry. It includes planning and preparing the implementation of the outburst mining management plan, implementing the outburst mining management plan, and auditing and reviewing the effectiveness of the outburst mining management systems.

Elements	Performance Criteria
1. Plan and prepare the implementation of the outburst mining management plan	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Roles and responsibilities are identified, clarified and communicated as specified in the ***outburst mining management plan***. 1.3. Resources required for the implementation of the ***outburst mining management plan*** are identified, forecasted, obtained and allocated/scheduled. 1.4. The program is implemented to satisfy identified outburst mining management training requirements. 1.5. Suggestions and recommendations are encouraged, received, reviewed and implemented where appropriate for changes to outburst mining management procedures.
2. Implement the outburst mining management plan	2.1. Outburst drilling and sample collection operational procedures are implemented. 2.2. Core sample analysis and reporting procedures are implemented. 2.3. ***Geological and geotechnical hazard*** identification and response procedures are implemented. 2.4. ***Actions*** and procedures required are implemented in response to gas threshold levels. 2.5. Permit is implemented to mine procedures in accordance with the ***outburst mining management plan***. 2.6. Procedures are implemented to minimize potential damage caused by outburst. 2.7. Outburst information recording and reporting procedures are

	implemented. 2.8. Emergency and evacuation plans and procedures are implemented. 2.9. Procedures are implemented for the recovery of services following outburst.
3. Audit and review the effectiveness of the outburst mining management systems	3.1. Outburst drilling and analytical operational procedures are ***audited*** for compliance with statutory and ***outburst mining management plan*** requirements. 3.2. Monitoring systems operations are ***audited*** for compliance with the ***outburst mining management plan***. 3.3. ***Geological and geotechnical*** identification, monitoring and response procedures are ***audited*** for compliance with the ***outburst mining management plan***. 3.4. ***R***ecording systems are ***audited*** for compliance with the ***outburst mining management plan***. 3.5. ***P***rocedures are developed for the recovery of services following outburst for compliance with current statutory and ***outburst mining management plan requirements***. 3.6. Emergency and evacuation plans and procedures are trialed and ***audited*** for compliance with the management plan. 3.7. Outburst training program is ***audited*** for currency, relevance and compliance with the requirements of the outburst management plan. 3.8. Respond promptly to instances of non-compliance and other discrepancies/deficiencies revealed by ***audit*** and the management plan modify as necessary. 3.9. Future outburst management requirements are identified, evaluated and incorporated into the outburst mining management planning procedures as stipulated by the ***outburst mining management plan***.

Variable	**Range**
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy

Outburst mining management plan	may include: • procedures for mine atmosphere monitoring • reporting requirements • auditing • ventilation systems and usage • pre-drilling techniques • initiation techniques • mine plan • action plans • response plans • emergency procedures • individual group responsibilities • training and education procedures
Hazards	may include: • irrespirable atmosphere • noxious atmospheres • flammable or explosive mixtures • induced outburst
Geological and geotechnical	includes that related to, but is not limited to: • subsidence • roof and floor technical data • gas content and composition • over and underlying strata • water bearing strata • permeability of seam and strata • physical properties • caving characteristics • outburst and stress waves • faults • intrusions • deformities
Principles of mine design	include: • recovery • reserve optimization • mining direction • geological structures • ventilation • strata control • mining method • productivity • environmental considerations

	• access
Geological and physical conditions of the seam and surrounding strata	may include: • cutters • changing cleat • coal colour • free gas into atmosphere • mylonite
Mine site historical information	may include: • sedimentology aspects of the mine site relating to subsidence • outburst • gas content and composition • roof and floor technical data • over and underlying strata • water bearing strata • permeability of seam and strata • hydrology • physical property testing results • caving characteristics • ground stress behavior
Ventilation structures	may include: • stopping • overcasts • regulators • preparation seals • fire doors • bulk heads • goaf seals • final seals • pressure chambers
Mine atmosphere monitoring	may include: • continuous monitoring • portable (hand held) monitoring • collection of bag samples • gas chromatography • ventilation measurements from all areas of the mine, including sealed areas and waste workings
Defects to mine structures	may include: • deterioration of materials • quality of construction • effects of surrounding strata • physical damage

	• water damage
Infrastructure	includes: • pipes • valves • hoses • pumps • drainage plant • flame arresters • power supply to bore holes • cleaning equipment • all other plant and equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for implementing the outburst management plan • implementation of procedures and techniques for the safe, effective and efficient implementation of the outburst management plan • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of outburst management plan elements that best meet the required outcomes • working with others to undertake and complete the implementation of the outburst management plan • consistent successful implementation of the outburst management plan
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and statutory requirements for mining structures, including plans, ventilation, gas monitoring, strata support and safety management plans • mine planning and design • the systems of mining, including tunnels, drifts, stone drivage, shaft sinking, pillar extraction, partial extraction, punch mining and fault drivage • stress analysis, including mining induced stress and topography • sedimentology, including subsidence, water bearing strata, permeability of seam and strata, hydrology, physical property testing, caving characteristics, windblast, outburst, gas content and over and underlying strata

	• systems of work, including board and pillar, place changing, longwall, highwall, auger mining, pillar extension, partial extension and punch mining • mining structure failure modes • exploration techniques • geology, lithology and strata gas characteristics • mining and general engineering principles relevant to the behavior of excavations in rock • ground support systems • audit methodologies • geotechnical engineering • excavation engineering • tunnel engineering and shaft sinking • rock mechanics • mine surveying • mining of coal deposits • thermodynamics • the impact of differing geological features and conditions on outburst, including faults, dykes, intrusions and strata deformities • mine gases; the types and their characteristics, sources, physiological effects and methods of detection • de-gassing; methods of control, including brattice, auxiliary, compressed air venturis, sails, hurdles and bleeders • fixed monitoring systems types, uses/limitations, design criteria, specifications and design processes • portable monitoring equipment, types, uses/limitations • the use of simulation techniques and applications relevant to outburst • computer-based systems for outburst analysis • outburst mining management plan development requirements and processes • processes and techniques for determining alarms and trigger points/levels • audit and review processes and techniques • emergency response and disaster planning processes and techniques • the effects of coal seam characteristics on outburst • methods of control of outburst • outburst indicators and ratios • risk management procedures • applicable mine rescue procedures

	• roles and responsibilities in accordance with outburst mining management plan
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures for outburst management plan implementation • access, interpret and apply technical information • access and interpret archival and historical outburst information related to the mine • interpret and apply mathematical and scientific theorems/laws related to outburst • perform outburst planning mathematical calculations • access and interpret design criteria for outburst management systems and devices • interpret computer spreadsheets and outburst modeling/simulations • conduct enquiries/investigations and prepare reports • communicate effectively in the workplace • access and interpret data from monitoring systems and equipment • operate hand held monitoring equipment • interpret outburst training requirement
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement the Site Water Management Plan**
Unit Code	**MIN MPR5 11 0114**
Unit Descriptor	This unit covers the implementing of the site water management plan in the mining and extractive industries. It includes: preparing for development of the plan; prepare the plan; and initiating, monitoring and adjusting the implementation of the plan.

Elements	Performance Criteria
1. Prepare for development of the management plan	1.1. ***Compliance documentation*** relevant to the implementation of the ***site water management plans*** is accessed, interpreted and applied. 1.2. The site ***geological***, ***hydrological and survey data*** relevant to the implementation of the plan are obtained, reviewed and interpreted. 1.3. The organization's water management systems requirements are accessed, interpreted and clarified, where applicable.
2. Prepare the management plan	2.1. ***Internal and external stakeholders*** in the planning process are involved in a way that uses their contribution effectively and gains their support for the outcomes. 2.2. The plan is developed and documented in accordance with operational requirements, the water management system, geological, hydrological and survey data, and requirements and procedures. 2.3. An emergency response plan is developed in any critical aspect of the mine water management system fail. 2.4. The ***resources*** required for the implementation of the plan are identified and acquired. 2.5. Any training required for personnel involved in the site water management operations is identified and arranged. 2.6. The site water management operations budget is prepared and presented.
3. Initiate, monitor and adjust the implementation of the management plan	3.1. The plan is issued and explained to team members and others involved, for the safe, effective and efficient implementation of the plan. 3.2. Roles and responsibilities and set targets and standards of achievement are allocated.

	3.3. Ongoing support and advice are provided timely to those implementing the plan. 3.4. Ensure required records and reports are maintained and issued. 3.5. The site water management performance is monitored against the organization and site requirements and the budget; anomalies are resolved in consultation with relevant stakeholders and appropriate instructions issued for adjustments to the plan and/or its implementation.

Variable	**Range**
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Site water management plan	may include: • risk management requirements • occupational health and safety requirements • environmental requirements • specific site water balances for peak and low scenarios • water reuse and recycle opportunities • site specific water recycling processes • site water withdrawals, including; volume and source use in normal and dry weather • adequate pumping capacities to meet current and future production needs • the volume and quality of discharges • clean and contaminated flows segregation • treatment programs for contaminated flows • wastewater volume usage and quality and how and where it should be stored for treatment before discharge • the protection of groundwater sources • existing neighbor water users and respective discharges • surface water resources, including; hydrological data of rivers, streams, lakes and wetlands and present surface water quality data • the quality and potential of ground water regime, local wells and surface water sources

	• requirements for testing management system for discharge waters, in accordance with legislative and organization's requirements • contingency plans for flood routing of waters in the pit's operational area to cope with peak flows and in accordance with organization's guidelines • procedures for pumping of waters from and within the site to achieve plan objectives and regulatory requirements • plans for surface drainage and total reticulation network servicing the life of pit according to engineering principles and organization's guidelines • plans for drainage structures and roads according to engineering principles and organization's guidelines • the staged development of civil aspects to the pits development for efficient and effective achievement of the overall development • requirements for the supervision of maintenance of the drainage scheme of the site to ensure its ongoing efficiency and effectiveness in achieving the plans objectives • site procedures for informing and instructing site personnel on all matters of drainage and reticulation required for the effective and efficient implementation of the plan • procedures for the monitoring of site drainage and wastewater treatment processes to ensure achievement of plan goals and regulatory requirements • procedures for recording the quality of site drainage effluent to meet regulatory and organization's requirements • water treatment systems to meet specifications • procedures for the monitoring of work on hydrological effects and sensitive ecological/conservations sites • procedures for the recording and adopting of integrated measures to mitigate hydrological impact and to encourage best practice at the site
Geological data	may include: • coal, rock and overburden properties • faults and joints • groundwater • springs
Hydrological data	may include: • rainfall • surface water, existing streams and dams • catchment areas and runoff characteristics

	• groundwater and bores • flood predictions
Survey data	may include: • site and neighboring land form • site and neighboring boundaries and structures • predicted flood levels • water pumping levels • locations of pipes, pumps
Internal and external stakeholders	may include: • site and offsite employees • contractors • equipment suppliers • geologists, surveyors and/or draughts persons • regulatory authorities representatives • community representatives • site neighbors
Resources	may include: • financial • labor • materials • services • plant and • equipment

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the implementing of the site water management plans • implementation of procedures and techniques for the safe, effective and efficient implementing of the site water management plans • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of options that best meet the required outcomes • working with others to undertake and complete the implementing of the site water management plans • consistent successful implementing of the site water management plans
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures

	• geological, hydrological and survey data • organization water management policy, objectives and procedures (where they exist) • license or environmental conditions • site water management development options and procedures • operational techniques required for execution of the plan • plant and equipment capabilities • work planning techniques • team leadership techniques • consultative and coaching techniques • work monitoring methods • recording and reporting systems • training systems
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • interpret legislative and site requirements and procedures • interpret and apply geological, hydrological and survey data • provide team leadership • apply procedures for selecting construction techniques • apply procedures for selecting and assigning plant and equipment • apply procedures for selecting development strategies • apply procedures for developing, initiating and administering work plans • interpret and apply operational performance data
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement Pit Plan**
Unit Code	**MIN MPR5 12 0114**
Unit Descriptor	This unit covers the implementation of pit plans in the mining and extractive industries. It includes preparation for, planning, initiating, monitoring and adjusting and reporting on the implementation of pit plans.

Elements	Performance Criteria
1. Prepare for development of the pit plan	1.1. ***Compliance documentation*** relevant to the implementation of the ***pit plan*** is accessed, interpreted and applied. 1.2. The ***geological***, ***geotechnical***, ***hydro geotechnical***, ***hydrological and survey data*** relevant to the implementation of the pit plan are confirmed. 1.3. The ***pit development parameters and strategies*** relevant to the implementation of the pit plan are accessed, interpreted and clarified.
2. Prepare the pit plan	2.1. ***Internal and external stakeholders*** in the planning process are involved in a way that uses their contribution effectively and gains their support for the outcomes. 2.2. The pit plan is developed and documented in accordance with the pit development parameters and strategies, the confirmed geological, geotechnical, hydro geotechnical, hydrological and survey data. 2.3. The ***resource*** required for the implementation of the pit plan is identified and acquired. 2.4. Any training required for personnel involved in the pit operations is identified and arranged. 2.5. The pit operations budget is prepared and presented.
3. Initiate, monitor and adjust the implementation of the pit plan	3.1. The pit plan is issued and explained to team members and others involved, for the safe, effective and efficient implementation of the pit development. 3.2. Ongoing support and advice are provided timely to those implementing the pit plan. 3.3. Ensure records and reports are maintained and issued. 3.4. The pit implementation of the pit plan is monitored against pit development parameters, strategies, the budget.

	3.5. Anomalies are resolved in consultation with relevant stakeholders and appropriate instructions issued for adjustments to the plan and/or its implementation.

Variable	Range
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Pit plan	may include: • Is the operational plan for the execution of part of the pit development in accordance with the sites pit development requirements parameters and strategies. It may cover a single stage in a multi-staged development or a specific period of time, such as a budget period may include site procedures and/or work instructions regarding: • risk management requirements • occupational health, safety and environmental requirements • marking out of extraction area and ensuring extraction is within these limits • land clearing and overburden stripping and stockpiling requirements • raw feed extraction requirements (such as sequencing, face heights, bench widths) • raw feed blending requirements • bank, face and slope stability criteria, risk management and supervision requirements • access and in-pit road requirements (such as grades, widths, turning and passing areas) • dewatering and water management requirements and procedures • extraction area finished shape and face requirements • rehabilitation and environmental works requirements (progressive and final) • tailings deposition/treatment requirements and procedures • roads maintenance requirements and procedures • reporting and record requirements and procedures
Geological data	may include: • limits of the deposit • rock (or other resource) types and characteristics, which may

	include: • ore and coal quality variations • coal, overburden, inter seam thicknesses and properties • parting or inter seams • faults and joints
Geotechnical data	may include: • material strengths • weak planes • stresses • rock mass strength • failure mode analysis
Hydro geological data	may include: • groundwater • artesian water
Hydrological data	may include: • rainfall • surface water, existing streams and dams • catchment areas and runoff characteristics • groundwater and bores
Survey data	may include: • site and neighboring land form • site and neighboring boundaries and structures • site and neighboring roads and other infrastructure • approved limits of extraction • title details • blasting layouts • earth movement surveys
Pit development parameters and strategies	may include: • limits of extraction • minimum operating distances from other operations or neighboring structures or land use • raw feed requirements to meet product need • raw feed blending requirements • annual extraction or sales limitations • environmental works • processing plant location • haulage requirements • land clearance • stripping and stockpiling soil • progressive and final rehabilitation requirements • final landform and use

	• maximum instantaneous charge • bench heights • safe slopes • water management requirements
Internal and external stakeholders	may include: • site and off-site employees • contractors • equipment suppliers • geologists, surveyors and/or draughts persons • regulatory authorities representatives • community representatives • site neighbors • customers
Resources	may include: • financial • labor • materials • services • plant • equipment • computer models • plan preparation

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the implementation of pit plans • implementation of procedures and techniques for the safe, effective and efficient implementation of pit plans • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of options that best meet the required outcomes • working with others to undertake and complete the implementation of pit plans • consistent successful implementation of pit plans
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • site risk, statutory compliance, health, safety, environmental, quality and communication requirements and procedures • geological data • geotechnical • hydro geological data

	• hydrological data • survey data • pit development strategic plan and its parameters and strategies • pit development options and procedures • operational techniques required for execution of the plan • plant and equipment capabilities • team leadership techniques • work planning techniques/team leadership techniques • consultative and coaching techniques • work monitoring methods • recording and reporting systems • training systems • emergency response and evacuation planning processes and techniques
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • interpret and apply legislative and organizational requirements • interpret and apply geological, hydrological and survey data • provide team leadership • apply procedures for selecting construction techniques • apply procedures for selecting and assigning plant and equipment • apply procedures for selecting development strategies • apply procedures for selecting plant and equipment • apply procedures to develop, initiate and administer work plans • interpret and apply operational performance data
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Develop, Implement and Maintain Process Control System**
Unit Code	**MIN MPR5 13 0114**
Unit Descriptor	This unit covers the implementation and maintenance of process control systems in extractive and mining industries. It includes the designing of the system, maintaining the quality of materials, providing advice to customers and maintaining the system.

Elements	Performance Criteria
1. Design process control systems	1.1. ***Compliance documentation*** relevant to the implementation and maintenance of process control systems is accessed, interpreted and applied. 1.2. Equipment is analyzes and selected to meet the production needs of the extractive operation. 1.3. Mechanical and technological advances in the bulk extraction, transport, handling and processing of extractive materials are optimized. 1.4. Safe practices, policies and training are initiated, encouraged and monitored for entire extractive operation. 1.5. Field conditions are surveyed, modified and recorded. 1.6. Cost parameters are designed, evaluated and measured and downstream effects identified. 1.7. Suppliers/manufacturers are consulted for developing solutions to particular problems, projects and needs. 1.8. Computing systems and recommend solutions are compared based on cost, support, material, quality produced, flexibility, servicing, environmental impact, profitability. 1.9. Monitoring and control systems are planned for effective ***management*** of the processing of materials and reliability of equipment. 1.10. Accurate records are planned and maintained for budgeting and future decision making. 1.11. ***Negotiate*** with electrical suppliers for power requirements, cabling, size of supply equipment, over-use penalties, tariffs, means of improving efficiency and back-up supplies.
2. Maintain quality of extractive materials	2.1. Accepted testing procedures used are implemented and monitored for assessing material quality in site laboratories.

	2.2. Appropriate expertise is accessed to perform tests that achieve consistent results, in line with site specific quality systems that conform to independent testing authority standards. 2.3. Appropriate work practices covering all potential environmental problems are applied. 2.4. Ensure that materials are blended to improve the product quality and to produce the best balance of properties for the customer's satisfaction. 2.5. Adjustments are recommended to production process to meet production quality parameters in accordance with site quality plan.
3. Provide advice to customers	3.1. A range of materials and their properties available to suit identified needs of customer are consulted with customers/clients and offer. 3.2. Material properties are identified for various uses.
4. Resource and utilize environmental knowledge	4.1. Data on existing climate, air quality, water ***resources***, flora and fauna and socio-economic items are collected and used in pre-production, operational and post-production control phases.
5. Carry out fault diagnosis and repairs	5.1. Routine monitoring and maintenance procedures are performed for testing equipment in line with manufacturers' specification. 5.2. Ensure that laboratory personnel are trained to maintain effectiveness of site quality system.

Variable	**Range**
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Management	operates within: • an environment ranging from small/medium/large operations • appropriate policies, guidelines and processes • established quality and continuous improvement processes • environmental standards • ethical standards established by the organization

	• strategic plans developed by the organization • productivity and profitability objectives and targets • international best practice and benchmarking principles and practices • technical standards established by industry and/or enterprise • legislation, codes and practices • resource parameters which may be defined or negotiated • a diverse range of plant/equipment, products and services • training and development/business and performance plans • enterprise/industrial agreements/awards • human resource practices and policies • learning organization principles and practices is responsible for: • evaluating equipment/plant and power requirements for mining operations • preparing a commercial viable project budget • evaluating, selecting, tendering and purchasing new equipment/plant • sourcing and raising capital development funding • planning and monitoring earth work operations • monitoring project timeframes against budget • commissioning geophysical surveys • quantifying resource and proving deposit • developing detailed site plans and working drawings • establishing a rehabilitation plan in line with regulative requirements • establishing and managing positive relations with others in the internal and external environment • research which could include: ➢ geological, climatic, hydrology/topography and environmental factors ➢ cultural and biological environments • improve customer relations • promote company image • influence operational performance • plan production schedules • records/reports ➢ oral/written/computer based • supervision of maintenance
Negotiation	may be with: • stakeholders • regulatory authorities

	• tenderers • operating managers • project managers • contractors • employees • community • suppliers • customers
Resources	may include: • people • buildings/facilities • finance • equipment • power/energy • technology • information • time

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • knowledge of the requirements, procedures and instructions for the implementation and maintenance of process control systems • implementation of procedures and techniques for the safe, effective and efficient implementation and maintenance of process control systems • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of process control systems that best meet the required outcomes • working with others to undertake and complete the implementation and maintenance of process control systems • consistent successful implementation and maintenance of process control systems
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • programmable logic controllers • metalliferous mining operations • metalliferous mining products and services • metalliferous mining plant and equipment • team management • quality system • statutory control

	• organizational objectives • resource monitoring • surveying • environmental management • OHS • computer applications • negotiation techniques • statistics
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • apply procedures for monitoring and maintaining operations • apply people and processes management techniques • apply production operations analysis and review procedures • apply projects and tasks management techniques • apply human and physical resource coordinating procedures • apply procedures to ensure delivery and maintenance of services to required specifications • apply traffic, equipment and maintenance systems procedures • apply techniques to evaluate new and used equipment • apply performance audit procedures (finance, energy, safety, environment, quality assurance, legislative compliance and products) • access and use appropriate technologies • apply management report preparation and presentation requirements and procedures • apply negotiating techniques (with internal/external customers, community and statutory/legal authorities) • apply conflict resolution techniques
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Establish and Maintain Mine Services Systems**
Unit Code	**MIN MPR5 14 0114**
Unit Descriptor	This unit covers the establishment and maintenance of mine service systems in the mining industries. It includes designing mine services systems, selecting equipment for mine services systems, establishing installation and commissioning procedures, establishing systems for the operation and maintenance of mine service systems and equipment, planning and preparing for the implementation of systems for the operation and maintenance of mine services systems and equipment, and establishing systems for audit and review of mine services systems and equipment.

Elements	Performance Criteria
1. Design mine services systems	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. The requirements for, and purpose of, ***mine services systems*** are identified in accordance with relevant legislative requirements and the system of mining. 1.3. A ***specification*** for the mine services system is developed from a comprehensive analysis of site requirements. 1.4. System options are identified from an analysis of all relevant technical, operational and financial information. 1.5. The preferred service systems options, including ***reticulation*** on the basis of performance are selected against specification requirements.
2. Select equipment for mine services systems	2.1. The requirements for, and purpose of, mine services equipment are identified against systems requirements. 2.2. A detailed scoping of the work requirements are conducted and key selection criteria, including hazard identification and risk analysis developed. 2.3. A specification for the required mine services equipment is developed. 2.4. The preferred equipment solutions are selected on the basis of performance against specification requirements.
3. Establish installation and commissioning procedures	3.1. A procedure is established to identify hazards and risks associated with the installation of mine services systems and equipment are analyzed and evaluated.

	3.2. The integration of new and existing systems and processes is planned and prepared to achieve optimum performance. 3.3. Safe operating procedures and rules are developed from a detailed analysis of site requirements. 3.4. Procedures are developed and established for installing and commissioning mine services systems and equipment. 3.5. A program, including systems and procedures, is established to satisfy identified mine services training requirements. 3.6. ***Emergency response*** and evacuation *systems*, plans and procedures are established. 3.7. ***Protection systems*** are established.
4. Establish systems for the operation and maintenance of mine services systems and equipment	4.1. Operational procedures are developed for mine services systems and equipment from site and legislative requirements and incorporated into ***site documentation***. 4.2. Maintenance procedures are developed for mine services systems and equipment from site and legislative requirements and incorporated into site documentation. 4.3. Procedures are developed and established for reviewing and modifying work processes.
5. Plan and prepare for the implementation of systems for the operation and maintenance of mine services systems and equipment	5.1. The relevant legislative and site requirements related to the operation and maintenance of mine services systems and equipment are identified and interpreted. 5.2. Mine services systems and equipment procedures are accessed, interpreted and clarified. 5.3. Mine services systems and equipment procedures are identified, clarified and communicated to all personnel roles and responsibilities, as specified. 5.4. Resources required for the implementation of mine services systems and equipment procedures are identified, forecasted, obtained and allocated/scheduled, 5.5. The mine services systems and equipment procedures training program is implemented. 5.6. Suggestions and recommendations are encouraged, received, reviewed and implemented, where appropriate, for changes to the operation and maintenance of mine services systems and equipment procedures,
6. Establish	6.1. Procedures are established to evaluate and confirm

systems for audit and review of mine services systems and equipment	system/equipment compliance with legislative and site requirements. 6.2. Future mine services systems and equipment requirements are identified, assessed and incorporated into planning processes. 6.3. Procedures are established to confirm the currency and compliance of mine services maintenance and safety standards. 6.4. The system is established for ***recording and reporting*** of mine services and equipment information. 6.5. The mine services training program is audited for currency and relevance. 6.6. Procedures are established for incorporating feedback into the audit/review system. 6.7. Emergency response and evacuation systems, plans and procedures are established for compliance with site requirements. 6.8. Procedures are established for response to instances of non compliance or other discrepancies/deficiencies revealed by audit.

Variable	**Range**
Relevant compliance documentation	may include: • legislative, organization and site requirements which may be contained in: ➢ relevant legislation and regulations ➢ management plans ➢ safety and health policy ➢ relevant code of practice ➢ manufacturer's instruction ➢ standard/safe working procedures ➢ industry guidelines
Mine services	may include: • power (air, gas, electricity, water, diesel, low energy source) • water, wastewater • fire fighting • gas drainage • fuel • waste disposal • condition monitoring

	• dust suppression and refrigeration
	• safety services including:
	  ➢ risk assessment process
	  ➢ fire fighting
	  ➢ First Aid
	  ➢ mines rescue

Mine services systems	may include:
	• design
	• development
	• establishment
	• installation
	• operations
	• protection
	• maintenance
	• monitoring
	• recording
	• reporting process
	• communication systems including:
	  ➢ oral
	  ➢ phones/radios
	  ➢ electronic
	  ➢ microwave
	  ➢ telemetry

Specification	may include: • performance requirements • costs • dimensions • capacity • safety and health requirements • training requirements • key selection criteria
Reticulation	may include: • water management • pumping of solids • fluid reticulation and storage • material reticulation and storage (hydraulic, electric, water and compressed air)
Emergency response systems	may include: • refuge chamber • designated escape ways • evacuation procedures • alarm systems

	• guidance systems • emergency communication systems • self-aided escape apparatus • mines rescue capability
Protection systems	may include: • explosion barriers • electrical protection • compressed air protection • hydraulic protection • environment protection • falling and roll-over protection • mechanical protection • frictional ignition protection • guarding • personal protection
Site documentation	may include: • relevant legislative and legislative requirements • management plans and procedures • training policy
Recording and reporting systems	may include: • phones • radios • computer systems • verbal • written
Support systems	may include: • mine plan • signage • stores system • roadway • development drives and openings • maintenance • drilling (raise boring and bore hole) • emergency response systems

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for establishment and maintenance of mine services systems • implementation of procedures and techniques for the safe, effective and efficient establishment and maintenance of mine services systems

	• the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of methods for the establishment and maintenance of mine services systems that best meet the required outcomes • working with others to establish and maintain mine services systems • consistent successful establishment and maintenance of mine services systems
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • audit review processes and techniques • computer based systems • emergency response and disaster planning processes and techniques • fire fighting systems and precautions • legislative and site specific requirements for mine services including: ➢ mine plans ➢ electrical distribution ➢ ventilation ➢ compressed air ➢ electrical/mechanical equipment ➢ inspection requirements ➢ environmental management ➢ communication ➢ emergency procedures ➢ risk management ➢ recording and reporting ➢ mines rescue ➢ OHS ➢ manufacturer's instructions ➢ standard work procedures ➢ training ➢ maintenance surveys ➢ mine design relating to mine services systems ➢ mine operating procedures including those applying to transport systems, conveyor systems, systems of mining, ventilation system, gas management and mine water management ➢ power sources including electrical, hydraulic, compressed air, diesel ➢ safety design features for maintenance of mine services systems

	➢ safety design features of mine services systems • stores systems
Underpinning Skills	Must demonstrate skills to: • access, interpret and apply technical information • apply legislative, organization and site requirements and procedures for establishment and maintenance of mine services systems • site/legislative requirements • records and reports • briefings and handover details • apply the principles of mine design • assess the risks and consequences attached to mine services systems and equipment • plan and coordinate work • identify training needs related to mine services systems • interpret and apply manufacturer's instructions • conduct maintenance surveys
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Undertake Process or Project Environmental Impact Assessment**
Unit Code	**MIN MPR5 15 0114**
Unit Descriptor	This unit covers undertaking of process or project environmental impact assessment in the mining or extractive industries. It includes: describing the process or project and the development environment; identifying their environmental issues; assessing environmental impacts; and evaluating alternatives.

Elements	Performance Criteria
1. Describe process or project and the development environment	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. Detailed description of the process or ***project*** environment is prepared before development. 1.3. Process or project life cycle is prepares with detailed information on all phases.
2. Identify environmental issues for process or project	2.1. Work with engineers and scientists to identify ***environmental issues***. 2.2. Each part of the process or project is assessed for impact on the local ecosystem. 2.3. Assessment criteria are stated clearly. 2.4. Both positive and negative impacts are identified. 2.5. Risks and hazards associated with the process or project, both short and long term is evaluated.
3. Assess environmental impact	3.1. Process or project is assessed against environmental regulations, site terms, conditions and licenses and company policy. 3.2. Qualified and justified assessment of impact on environment is made. 3.3. Ensure ***assessment documents*** are used as the scientific basis for assessment. 3.4. Assessment is presented in clearly written and illustrated format.
4. Evaluate alternatives	4.1. Ensure all practical solutions to impact assessment are included in analysis. 4.2. Objective and scientifically valid alternatives are prepared.

	4.3. Comparisons are prepared using cost benefit analysis where possible. 4.4. Alternative processes or amended project are/is identified to minimize environmental impact.

Variable	Range
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Project phases	may include: • site preparation • construction • operations • proposed expansions • decommissioning • rehabilitation • site closure
Environment	may include: • physical • biological • social • regional • land uses • tenures • climate • geology • landforms • soils • surface and ground water • water quality • air quality • hydrology • dust and noise • pollutants • contaminants • vegetation, plant diseases, clearance and weeds • animal life, habitats, mobility, threats

	• rare and endangered species • community infrastructure • ethnography of area • archaeology • regional and local demography
Environmental issues	may include: • physical issues including: ➢ significant land disturbance ➢ erosion, subsidence and instability ➢ alteration of water courses ➢ effects on quality, quantity or availability of surface water or groundwater ➢ salination of water or land ➢ acid drainage ➢ heavy metal contamination ➢ impact on coastal processes • ecological issues including: ➢ direct impacts on vegetation ➢ loss of habitat ➢ displacement of fauna ➢ impact on ecological processes ➢ loss of biodiversity ➢ potential for spreading plant diseases and noxious weeds ➢ impact of toxic or hazardous materials ➢ creation of new habitats • land use issues including: ➢ major changes of land use ➢ compatibility of development with surrounding land uses ➢ preclusion of alternative land use e.g. conservation or recreation ➢ increased demand on scarce natural resources ➢ creation of new water storage and supplies ➢ creation of opportunities for alternative beneficial land uses • social issues including: ➢ influx of population ➢ impact on health and safety ➢ changes in community character ➢ creation of employment ➢ increased revenue for local communities ➢ community and cultural aspects • infrastructure issues including: ➢ load on existing roads • impact on services including utilities, health, education,

	community services
Environment assessment documents	may include: • EIA - Environmental Impact Assessment • EIS - Environmental Impact Statement • PER - Public Environmental Report • NOI - Notice of Intention

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for undertaking process or project environmental impact assessment • implementation of procedures and techniques for the safe, effective and efficient undertaking of process or project environmental impact assessment • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of the options that best meet the required outcomes • working with others to undertake and complete process or project environmental impact assessment • consistent successful completion of process or project environmental impact assessment
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • company environmental policy and procedures • process or project and/or proposal phases • physical environment as impacted by mining operations • ecological environment as impacted by mining operations • land use profiles • social issues as impacted by mining operations • impact of mining operations on infrastructure • legislation, regulation, licenses and permit requirements for mining operations • data analysis systems, including statistical analysis • support professions role and function (engineers, scientists etc) • budgeting and cost cycle planning
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • write advanced reports • solve problems • operate computer data analysis systems (database,

	spreadsheet, specialist programs) • assess risks and hazards • perform financial assessments • plan projects
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement Mine Transport Systems and Production Equipment**
Unit Code	**MIN MPR5 16 0114**
Unit Descriptor	This unit covers implementing mine transport systems and production equipment in the mining industries. It includes: planning and preparing for implementation; and implementing systems for installation, commissioning, operation, maintenance, audit and review.

Elements	Performance Criteria
1. Plan and prepare for the implementation	1.1. ***Compliance documentation*** relevant to implementing of mine ***transport systems and production equipment*** is accessed, interpreted and applied. 1.2. The purposes of transport systems and production equipment are identified in accordance with the system of mining. 1.3. Site requirements are identified and recorded for the implementation of production equipment and/or transport systems. 1.4. The ***specifications*** are accessed and interpreted for the required production equipment and/or transport systems 1.5. Roles and responsibilities are identified, clarified and communicated. 1.6. Training needs are identified. 1.7. ***Site requirements*** are accessed and interpreted.
2. Implement systems for installation and commissioning	2.1. ***Hazards*** associated with the installation and operation of production equipment and transport systems are identified and ***risks*** are evaluated in accordance with established procedures. 2.2. Emergency response and evacuation plans and procedures are implemented in accordance with site requirements. 2.3. New and existing work systems and processes are integrated to achieve required outcomes. 2.4. Standard operating procedures are implemented. 2.5. Site production and transport installation and commissioning procedures are implemented. 2.6. The program is implemented to satisfy identified production and transport training requirements.

	2.7. Equipment and systems are commissioned in accordance with manufacturer's ***specifications*** and site procedures. 2.8. Equipment and systems are modified to satisfy required changes arising from the commissioning process.
3. Implement systems for the operation and maintenance of transport systems and production equipment	3.1. Procedures are implemented for the operation of production equipment and transport systems in accordance with legislative, manufacturer's and site requirements. 3.2. Reporting and recording systems are implemented in accordance with legislative and site requirements. 3.3. Procedures are implemented and applied for reviewing and modifying work processes.
4. Implement systems for audit and review	4.1. Production equipment and transport systems standards are ***audited*** for compliance with legislative and site requirements. 4.2. Production and transport ***maintenance*** standards are audited for currency and compliance with legislative and site requirements. 4.3. Systems and equipment are audited for compliance with legislative and site requirements. 4.4. Emergency response and evacuation plans and procedures are audited for compliance with site requirements. 4.5. Reporting and recording systems are audited for production and transport equipment for compliance with legislative and site requirements. 4.6. The training program is audited for currency, relevance and compliance with site requirements.

Variables	**Range**
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
System	may comprise: • policy, standards, procedures and tools/protocols
Transport systems	include capacities for personnel, equipment/materials and may be: • wheeled transport including: ➢ rubber-tyred man transport

	➢ multipurpose vehicles ➢ load haul dump ➢ forklifts ➢ front end loader ➢ skid steer loader ➢ grader • rail transport may include: ➢ locomotives (electric/diesel) ➢ rail mounted personnel carriers ➢ rolling stock • tracked vehicles may be fixed or mobile and may include: ➢ shearer carrier ➢ personnel carriers ➢ chock recovery vehicles (mules) ➢ site dozer • shaft and drift winding systems may include product, personnel and material including: ➢ head gear ➢ cages and skips ➢ winding apparatus ➢ communications ➢ control system discharge ➢ loading facilities ➢ counter balances • conveyor system including: ➢ conveyor belts ➢ drive heads ➢ tail ends transfer points ➢ surge bins ➢ inter seam bins ➢ fabricated bins ➢ chain conveyors • product slurry pumping including: ➢ batching stations ➢ dewatering systems ➢ water reticulation pumping stations
Production equipment (manual or remote control)	may include: • shearer • armoured faced conveyor • pantech • hydraulic roof supports • stage loader • face drill rigs

	• shuttle cars • ram cars • ratio/breaker feeders • breaker line support • roof bolters (mobile and hand held) • rib bolters • road header • continuous miners • in-seam miners • high wall miners • auger miners • loaders • shot firing • hydraulic mining
Specifications	may include, but not be limited to: • performance requirements • costs • dimensions • capacity • OHS requirements • training requirements • key selection criteria
Site requirements	are also known as: • Standard Operating Procedures (SOP) • safe working procedures • safe operating procedures • standard working procedures
Hazard	is defined as: • a source of potential harm or a situation with a potential to cause loss
Risk	is defined as: • the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood
Audit	is defined as: • a systematic examination against defined criteria to determine whether activities and related results conform to planned arrangement, and whether these arrangements are implemented effectively and are suitable to achieve the organization's policy and objectives
Maintenance	may be divided into: • predictive

	• preventative • breakdown

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the implementing of mine transport systems and production equipment • implementation of procedures and techniques for the safe, effective and efficient implementing of mine transport systems and production equipment • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of options that best meet the required outcomes • working with others to undertake and complete the implementing of mine transport systems and production equipment • consistent successful implementing of mine transport systems and production equipment
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • legislative and site requirements and instructions including transport rules, no-go zones for mobile equipment, maintenance schemes, SOPs training, statutory testing on diesel vehicles, battery charging, underground fuel depots, conveyor belts • site operation procedures • assessment of geological structures • site plans • site design relating to production and transport systems and equipment • production and transport systems and equipment management requirements • site environmental monitoring requirements • risk management procedures • production and transport systems and equipment statutory inspection requirements • site transport systems design and functionality • site reporting procedures • emergency response and evacuation planning processes and techniques • maintenance and modification systems • audit review processes and techniques • site document control requirements

	• production and transport equipment and systems; the types, uses, characteristics and limitations appropriate for safe operation at the site including braking systems • energy sources including electrical, hydraulic, pneumatic, diesel • safety design features of production and transport systems including traffic control devices • safe operating procedures relating to production and transport equipment • stores systems • specification design criteria including access, noise, dust, lighting, ergonomics, remote control, physical clearance, confined space, visibility, seating vibration and machine equipment and personal protection • development, administration and review of procedures that apply to the system • raining plan • standard operating procedures relating to production and transport equipment • safety design features for maintenance of production and transport equipment • use of computer based systems for production and transport systems • fire fighting systems and precaution rules
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • provide information/briefings and handover details • apply hazard identification and risks assessment processes • apply transport systems and production equipment management procedures • apply work planning and coordination procedures • apply training needs identification procedures • interpret and apply manufacturer's instructions • apply maintenance and modification surveys and audits
Resources Implication	Assessment is required to real or appropriate simulated situations, including work areas, materials and equipment, and information on workplace practices and OHS practices.
Methods of Assessment	Competency may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Implement, Monitor, Rectify and Report on Contracts**
Unit Code	**MIN MPR5 17 0114**
Unit Descriptor	This unit covers the implementation, monitoring, rectifying and reporting on contracts in the resources and infrastructure industries. It includes implementation, monitoring and reporting administrative procedures, monitoring contract time frame and specifications, resolving contractual disputes and implementing contract completion.

Elements	Performance Criteria
1. Implement, monitor and report administrative procedures	1.1. ***Compliance documentation*** relevant to the work activity is accessed, interpreted and applied. 1.2. ***Contract administration*** procedures are implemented for reviewing ***contract performance*** against performance criteria. 1.3. Procedures are implemented for monitoring and rectifying performance. 1.4. Procedures are developed and implemented for adjusting performance where performance does not meet contractual requirements.
2. Monitor contract time frame and specifications	2.1. Regular inspection of contract services is undertaken to ensure compliance with contract specifications. 2.2. Variations between the specified scope of services and the contract are identified and documented, and relevant personnel notified. 2.3. ***Testing*** of services in progress is carried out by the contractor in accordance with legislative, regulation and worksite requirements.
3. Resolve contractual disputes	3.1. Disagreements are investigated to identify cause and validity. 3.2. Terms of resolution are negotiated and agreed. 3.3. Contracted prescriptions are followed for dispute resolution. 3.4. Specified advice is sought to resolve disputes. 3.5. Appropriate technical/legal advice is sought to clarify dispute issues.
4. Implement contract	4.1. ***Contract conditions*** and responsibilities are reviewed with

completion	appropriate personnel to ensure satisfactory completion. 4.2. Contract completion is reported to appropriate personnel. 4.3. Contract performance is evaluated against agreed benchmarks.

Variable	Range
Compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Contracts	may be for : • products • maintenance contracts • supply contract • cleaning contracts • waste removal contracts • plant and equipment commissioning and decommissioning contracts • equipment supply contracts • other worksite requirements
Administration	may include: • supervision • management • monitoring • overseeing
Contract performance	is evaluated in terms of: • adherence to time lines • costs • progress towards objectives • adherence to quality standards • occupational health and safety standards
Testing	may include: • sampling • routine checks • audit • observation • meetings • occupational health and safety checks
Contract conditions	may include:

	• tender documentation • maintenance plans • defects liability

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for implementing, monitoring, rectifying and reporting on contracts • implementation of procedures and techniques for the safe, effective and efficient implementation, monitoring, rectification and reporting on contracts • the identification of the relevant information and scope of the work required to meet the required outcomes • the identification of viable options and the selection of processes to implement, monitor, rectify and report on contracts that best meet the required outcomes • working with others to undertake and complete the implementation, monitoring, rectification and reporting on contracts • consistent successful implementation, monitoring, rectification and reporting on contracts
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • organizational strategic and marketing objectives, plans and performance measures • principles of the marketing mix • key provisions of relevant legislation from all forms of government, codes of practice and national standards that may affect aspects of business operations such as: ➢ ethical principles ➢ marketing codes of practice and conduct • Trade Practices Act.
Underpinning Skills	Must demonstrate skills of: • legislative and statutory requirements and the instructions relating to contract maintenance • site operation procedures • site design relating to contracted services • contract management requirements • risk management procedures • inspection and testing of contracted services / products • site reporting procedures • review processes and techniques

	• knowledge of contract design criteria • training programs • computer based systems
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Manage Major Incidents and Emergencies**
Unit Code	**MIN MPR5 18 0114**
Unit Descriptor	This unit covers the management of major incidents and emergencies in resources and infrastructure industries. It includes: reviewing the systems; managing the incident and emergency response; accessing and responding to information, advice and support; applying post-incident management procedures; and auditing and reviewing the effectiveness of the incident and emergency management response.

Elements	Performance Criteria
1. Review emergency preparedness and response systems	1.1. ***Compliance documentation*** relevant to the management of major incidents and emergencies is accessed, interpreted and applied. 1.2. The emergency preparedness plan is reviewed and confirmed for relevance and timeliness on a regular basis. 1.3. The organizational structure is reviewed for the management of emergency preparedness and response for relevance and accuracy on a regular basis. 1.4. Emergency response procedures for management of classes of ***incident*** are reviewed for relevance and accuracy on a regular basis. 1.5. The emergency response procedures are confirmed for management of decision-making processes and decision monitoring systems. 1.6. Plans are confirmed with relevant ***stakeholders*** and specialists.
2. Manage the incident/ emergency response	2.1. Incident information receipt and recording systems are accessed in accordance with site requirements. 2.2. Emergency response and evacuation plans and procedures are accessed and applied in accordance with site requirements. 2.3. ***Operations facilities***, including ***communications*** are established to support them, in accordance with the emergency plan. 2.4. Action planning processes are applied to manage the situation/incident in accordance with the emergency plan.

	2.5. ***Required services***, personnel, ***equipment*** and ***resources*** for the incident are identified and applied in accordance with the emergency plan. 2.6. Roles and responsibilities are confirmed and clarified, as specified in the emergency response and evacuation plans and procedures and communicated to all persons.
3. Access and respond to information, advice and support	3.1. Specialist technical and professional staff is brought to review the situation. 3.2. Plans are developed to deal with ***immediate areas of concern***. 3.3. Individual's roles and responsibilities are clarified and confirmed.
4. Apply post-incident management procedures	4.1. ***Post-incident management*** processes are determined and established to investigate nature and cause of situation/incident in accordance with ***statutory*** and site requirements.
5. Audit and review the effectiveness of the incident/emergency management response	5.1. Response systems are ***audited*** for effectiveness and compliance with statutory and management plan standards. 5.2. Incident/emergency management response processes are audited for effectiveness and for compliance with worksite requirements. 5.3. Recording systems are audited for effectiveness and for compliance with the emergency preparedness and response plan. 5.4. Instances of non-compliance or other discrepancies/deficiencies revealed by audit are responded promptly and the incident/emergency management system is modified accordingly.

Variable	**Range**
Relevant compliance documentation	may include: • legislative, organizational and site requirements and procedures • manufacturer's guidelines and specifications • Ethiopian standards • management plans • OHS policy
Types of incidents	can be identified as: • chemical injury

	• entrapment • equipment damage • fire • fugative chemicals • inundation • irrespirable atmosphere • personnel injury or death • rock fall • unscheduled explosion can be caused by: • aircraft accident • bulk-head collapse • explosives • flammable solids or liquids • Hazchem • inrush • mining induced subsidence • outburst • release of stored energy • seismic event • sulphide dust explosion • vehicle accidents • vehicle fire
Stakeholders	can include: • ambulance • board of directors • contractors • critical incident stress debriefing organizations • customers • emergency management and assistance organizations • employee representatives • employees • families • fire brigade • government mining authorities • hospital • insurance companies • local community • local government • manufacturers • medical staff

	• mines rescue service • police • specialist professionals • suppliers
Operations facilities	are those which are set up to manage an incident and may include: • operations centre • press room • mortuary • muster areas • meeting rooms
Communications	may include: • radio • telephone • telemetry • verbal • written • computers • runners • mirrors • signals • stench gas alarms/sirens
Required services	may include: • internal worksite services and resources • contractors • suppliers • local community • manufacturers • inspectorate • police • mines rescue services • fire brigade • ambulance • medical staff • hospital • critical incident stress debriefing organizations • local emergency management organizations • local government • media • coroner's representative • security services

	• solicitors • workers' representatives • other worksites • experts such as engineers, scientists • down-hole camera • drill rigs • forensic
Equipment	refers to that needed to control the incident and includes but is not restricted to: • rescue equipment • mining equipment • transport • specialized equipment from external sources • monitoring and analysis equipment • breathing apparatus
Resources	may include, but are not limited to: • people • finance • equipment • environment • buildings/facilities • technology • information
Immediate areas of concern	may include: • employee welfare • dealing with the media • legal issues • environmental aspects • informing the community
Post-incident management	is: • the control of activities arising from an incident and can include: ➢ legal advice ➢ environmental aspects ➢ critical incident stress debriefing ➢ interviewing ➢ investigations ➢ witness interview statements ➢ restoration of normal operations ➢ media releases ➢ public relations ➢ employee welfare and family support

	➢ security of evidence ➢ liaison with statutory/legal bodies ➢ statutory investigations ➢ review of emergency procedures ➢ documentation of ongoing operations ➢ restoration of emergency preparedness
Statutory requirements	may include but are not limited to: • common law • coroner • dangerous goods • development of training policies/programs to aid compliance • emergency services • environmental • explosives • gas and petroleum • industrial relations • local government • minerals and extractive industry licensing • mines act • navigation • planning and assessment • road traffic • safety and health • trade practices • waterways • weights and measures • workers compensation/Work Cover
Audit	is: • a systematic examination against defined criteria to determine whether activities and related results conform to planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve the organization's policy and objectives

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills of: • the requirements, procedures and instructions for the management of major incidents and emergencies • implementation of procedures and techniques for the safe, effective and efficient management of major incidents and emergencies • the identification of the relevant information and scope of the

	work required to meet the required outcomes • the identification of viable options and the selection of options that best meet the required outcomes • working with others to undertake and complete the management of major incidents and emergencies • consistent successful management of major incidents and emergencies
Underpinning Knowledge and Attitudes	Must demonstrate knowledge of: • audit review process and techniques • call-out procedures • classification of types of incidents • decision making processes • deployment of staff underground • economic considerations and decisions • effects of heat and humidity • effects of visibility • emergency and disaster planning processes and techniques • emotional effects of emergencies on rescuers and worksite personnel • environmental risks and controls • equipment handling • equipment required for different types of emergency • escape strategies and technology • hazard identification • incident resources and how to access them • industry and legislative stakeholders • insurance policies and considerations • intervention and control techniques for heating, fires, explosions, outburst, extrication or inrushes • legal implications of incidents • legal requirements of incident management teams • legislation applicable to worksites • legislation regarding resumption of normal operations • legislative requirements • media policies and procedures • worksite closure procedures and the legislative implications • mine rescue guidelines and capabilities • worksite-type incidents and risks • numbers needed to run the worksite at planned operational levels • rescue team structure, procedures and equipment, and standby team requirements

	• risk management principles and techniques • sealing procedures and the legislative implications • self-escape philosophies, systems and equipment • services and agencies available to assist in an emergency • structure of emergency guidelines • structure of emergency organizations • structure, roles, capabilities and operational limitations of external resources and agencies used during worksites incidents • support services role and access • the requirements and structure for fresh air base/refuge chambers • the role of stakeholders • the techniques and equipment used for collecting and analyzing atmospheric conditions • titles and roles of members of incident management team • training and assessment principles • ventilation and its influence on incidents, and decisions to be made
Underpinning Skills	Must demonstrate skills to: • apply legislative, organization and site requirements and procedures • access and apply worksite information and recording systems • analyze information • assess hazards and associated risks • apply brainstorming to collect maximum information • apply fault-tree analyzes • communicate effectively with members of the media • communicate effectively with people personally or through technical devices during incidents • delegate responsibility and tasks • develop action plans • apply effective interviewing techniques • apply effective questioning techniques • evaluate systems and equipment • facilitate groups to work together • apply procedures to formulate and develop emergency preparedness plans • identify or establish worksite facilities for incident management • make effective decisions • apply procedures to Organize personnel and resources

	• participate as a team member • read and interpret worksite plans • write reports
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Manage Project Quality**
Unit Code	**MIN MPR5 19 0114**
Unit Descriptor	This unit specifies the outcomes required to manage quality within projects. It covers determining quality requirements, implementing quality assurance processes, and using review and evaluation to make quality improvements in current and future projects.

Elements	Performance Criteria
1. Determine quality requirements	1.1 ***Quality objectives***, standards and levels are determined, with input from stakeholders and guidance of a higher project authority, to establish the basis for quality outcomes and a ***quality management plan***. 1.2 Established ***quality management methods, techniques and tools*** are selected and used to determine preferred mix of quality, capability, cost and time. 1.3 Quality criteria are identified, agreed with a higher project authority and communicated to stakeholders to ensure clarity of understanding and achievement of quality and overall project objectives. 1.4 Agreed quality requirements are included in the project plan and implemented as basis for performance measurement.
2. Implement quality assurance	2.1 Results of project activities and product performance are measured and documented throughout the project life cycle to determine compliance with agreed quality standards. 2.2 Causes of unsatisfactory results are identified, in consultation with the client, and appropriate actions are recommended to a higher project authority to enable continuous improvement in quality outcomes. 2.3 Inspections of quality processes and ***quality control*** results are conducted to determine compliance of quality standards to overall quality objectives. 2.4 A quality management system is maintained to enable effective recording and communication of quality issues and outcomes to a higher project authority and stakeholders.
3. Implement project quality improvements	3.1 Processes are reviewed and agreed changes implemented continually throughout the project life cycle to ensure continuous improvement to quality.

	3.2 Project outcomes are reviewed against performance criteria to determine the effectiveness of quality management processes and procedures. 3.3 Lessons learned and recommended ***improvements*** are identified, documented and passed on to a higher project authority for application in future projects.

Variable	**Range**
Quality objectives	May include but not limited to: • requirements from the client and other stakeholders • requirements from a higher project authority • negotiated trade-offs between cost, schedule and performance • those quality aspects which may impact on customer satisfaction
Quality management plan	May include but not limited to: • established processes • authorizations and responsibilities for quality control • quality assurance • continuous improvement
Quality management methods, techniques and tools	May include but not limited to: • brainstorming • benchmarking • charting processes • ranking candidates • defining control • undertaking benefit/cost analysis • processes that limit and/or indicate variation • control charts • flowcharts • histograms • pareto charts • scatter gram • run charts
Quality control	May include but not limited to: • monitoring conformance with specifications • recommending ways to eliminate causes of unsatisfactory • performance of products or processes • monitoring of regular inspections by internal or external agents
Improvements	May include but not limited to: • formal practices, such as total quality management or

	continuous improvement • improvement by less formal processes which enhance both the product quality and processes of the project, for example client surveys to determine client satisfaction with project team performance

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge in: • lists of quality objectives, standards, levels and measurement criteria • records of inspections, recommended rectification actions and quality outcomes • management of quality management system and quality management plans • application of quality control, quality assurance and continuous improvement processes • records of quality reviews • lists of lessons learned and recommended improvements Processes that could be used as evidence include: • how quality requirements and outcomes were determined for projects • how quality tools were selected for use in projects • how team members were managed throughout projects with respect to quality within the project • how quality was managed throughout projects • how problems and issues with respect to quality and arising during projects were identified and addressed • how projects were reviewed with respect to quality management • how improvements to quality management of projects have been acted upon
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • the principles of project quality management and their application • acceptance of responsibilities for project quality management • use of quality management systems and standards • the place of quality management in the context of the project life cycle • appropriate project quality management methodologies; and their capabilities, limitations, applicability and contribution to project outcomes • attributes: ➢ analytical

	➢ attention to detail ➢ able to maintain an overview ➢ communicative ➢ positive leadership
Underpinning Skills	Demonstrate skills of: • ability to relate to people from a range of social, cultural and ethnic backgrounds, and physical and mental abilities • project management • quality management • planning and organizing • communication and negotiation • problem-solving • leadership and personnel management • monitoring and review skills
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Facilitate and Capitalize on Change and Innovation**
Unit Code	**MIN MPR5 20 0114**
Unit Descriptor	This unit specifies the outcomes required to plan and manage the introduction and facilitation of change; particular emphasis is on the development of creative and flexible approaches, and on managing emerging opportunities and challenges.

Elements	Performance Criteria
1. Participate in planning the introduction and facilitation of change	1.1 Concept, nature importance and objective of change are understood. 1.2 Steps tools and approaches of changes are planned and made in consultation with ***appropriate stakeholders***. 1.3 The relationship among innovation, quality, change and cost is understood. 1.4 Environments that facilitate the expedition of change are understood. 1.5 ***Change resistance reducing techniques*** are identified and implemented.
2. Manage growth and transition of business	2.1 ***Needs for growth*** are identified. 2.2 ***Growth strategies*** are identified. 2.3 Selected growth strategies are implemented.
3 Develop creative and flexible approaches and solutions	3.1 Concepts, types and nature of problem are understood. 3.2 Variety of problem solving techniques and approaches are identified and analyzed to manage workplace issues. 3.3 ***Risks*** are identified and assessed, and action initiated to manage these to achieve a recognized benefit or advantage to the organization. 3.4 Workplace is managed in a way which promotes the development of innovative approaches and outcomes. 3.5 Creative and responsive approaches to resource management are used to improve productivity and services, and/or reduce costs.
4 Manage emerging challenges and	4.1 Future challenges and opportunities are identified in reference to global business situation 4.2 The role of technology and its value additions are explained.

opportunities	4.3 Technology and innovation based system is introduced and implemented 4.4 Individuals and teams are supported to respond effectively and efficiently to changes in the organization's goals, plans and priorities. 4.5 Coaching and mentoring are made to assist individuals and teams to develop competencies to handle change efficiently and effectively. 4.6 Opportunities are identified and taken as appropriate to make adjustments and respond to the changing needs of customers and the organization. 4.7 ***Information needs*** of individuals and teams are anticipated and facilitated as part of change implementation and management. 4.8 Recommendations are identified, evaluated and negotiated for improving the methods to manage change with appropriate individuals and groups.

Variables	**Range**
Appropriate stakeholders	May include but not limited to: • Organization directors and other relevant managers • Teams and individual employees who are both directly and indirectly involved in the proposed change • Union/employee representatives or groups • OHS committees • Other people with specialist responsibilities • External stakeholders where appropriate - such as clients, suppliers, industry associations, regulatory and licensing agencies
Change resistance reducing techniques	May include but not limited to: • Education and communication • Participation and involvement • Facilitation and support • Negotiation and agreement • Manipulation and cooptation • Explicit and implicit coercion
Needs for growth	May include but not limited to: • Survival • Economies of scale • Expansion of market

	• Owners mandate • Technology • Government policy • Self sufficiency
Growth Strategies	May include but not limited to: • Franchising • Outsourcing • Sub-contracting • Merging
Risks	May include but not limited to: • Financial and non-financial risks
Information needs	May include but not limited to: • New and emerging workplace issues • Implications for current work roles and practices including training and development • Changes relative to workplace legislation, such as OHS, workplace data such as productivity, inputs/outputs and future projections • Planning documents • Reports • Market trend data • Scenario plans • Customer/competitor data

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Participate in planning the introduction and facilitation of change • Manage growth and transition of business • Develop creative and flexible approaches and solutions • Manage emerging challenges and opportunities
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • Relevant legislation from all levels of government that affects business operation, especially in regard to occupational health and safety and environmental issues, equal opportunity, industrial relations and anti-discrimination • Growth strategies • The principles and techniques involved in: ➢ Change and innovation management ➢ Development of strategies and procedures to implement and facilitate change and innovation • Use of risk management strategies: ➢ Identifying hazards,

	➢ Assessing risks and implementing risk control measures ➢ Problem identification and resolution ➢ Leadership and mentoring techniques ➢ Management of quality customer service delivery ➢ Consultation and communication techniques ➢ Record keeping and management methods ➢ The sources of change and how they impact ➢ Factors which lead/cause resistance to change ➢ Approaches to managing workplace issues
Underpinning Skills	Demonstrate skills on: • Communication skills • Planning skills • Managing risk • Team work
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Mining and Mineral Processing Level V	
Unit Title	**Manage Continuous Improvement Process (Kaizen)**
Unit Code	**MIN MPR5 21 0114**
Unit Descriptor	This unit describes the performance, outcomes, knowledge, attitude and skills required to sustain and develop an environment in which continuous improvement, innovation and learning are promoted, rewarded and managed.

Elements	Performance criteria
1. Diagnose the current status.	1.1 ***Parameters*** used for study current situation are obtained. 1.2 Internal and external environment is analyzed. 1.3 Problems related to targeted environment is recognized and identified. 1.4 Problems regarding to current situation are analyzed. 1.5 Alternatives are generated. 1.6 Best alternatives are selected.
2. Design an effective continuous improvement process (kaizen).	2.1 The values, mission and goals of kaizen management system are clarified. 2.2 The ***kaizen management template*** and a visual management logo full of purpose and meaning are developed. 2.3 A clear action strategy (master and detailed plans) is defined. 2.4 The most effective and proven ***kaizen tools*** are chosen and applied. 2.5 A practical way is identified to involve all employees in ***Gemba activities*** (top, middle and bottom).
3. Develop change capability.	3. 1. Kaizen Promotion Team Structure is developed. 3. 2. The Kaizen Training Plan is defined and started. 3. 3. Supervisors' kaizen capability and habits are developed. 3. 4. Key people are developed in terms of ***Individual leadership capability***.
4. Implement improved processes.	4.1 ***Sustainability/continuous improvement*** are promoted as an essential part of doing business. 4.2 Impacts of change and consequences are addressed for people, and transition plans implemented.

	4.3 Objectives, time frames, measures and communication plans are ensured in place to manage implementation. 4.4 Contingency plans are implemented in the event of non-performance. 4.5 Failure is followed-up by prompt investigation and analysis of causes. 4.6 Emerging challenges and opportunities are managed effectively. 4.7 Continuous improvement systems and processes are evaluated regularly. 4.8 Improvements are communicated to all relevant groups and individuals. 4.9 Opportunities are explored for further development of value stream improvement processes.
5. Establish direction and control.	5.1 A ***system audit tool*** is defined and implemented. 5.2 The kaizen management system is deployed across all company levels and functions. 5.3 Results are checked and corrections made. 5.4 ***Standard operating procedures*** are developed and maintained. 5.5 The recruit, training and evaluation systems are improved and ***HR practices*** compensated.

Range	**Variables**
Parameters	May include but not limited to: • Working condition • Resources may include: ➢ Human ➢ Material ➢ Machine • Kaizen elements
Kaizen management template	May include but not limited to: • Visual management board for: ➢ displaying characteristic figures, data and graphics ➢ depicting and controlling processes ➢ identifying and marking sources of risks, setting and standards ➢ displaying company's values and goals of kaizen

Kaizen tools	May include but not limited to: • 5S (a visual workplace management) • 7 QC tools(Cause and Effect Diagram, Check Sheet , Pareto Diagram , Histogram, Scatter Diagram, Control Chart and Flow Chart) • Brainstorming • Basic Industrial Engineering (IE) tools such as time study, motion study, line balancing, work sampling • JIT(JUST IN TIME principles) • MUDA identification and elimination tools • Kanban • Poka-yoke • Takt- time
Gemba activities	May include but not limited to: • Value-adding activities to satisfy the customer • Employee autonomous operations (participating in team to identify nonconformity, propose solutions and implement them autonomously)
Individual leadership capability	May include but not limited to: • Personal and interpersonal skills • Courage • Honour and integrity • Energy and drive • Strategic skills • Operating skills • Organizational positioning skills
Sustainability/continuous improvement	May include but not limited to: • Improvements made by following PDCA (Plan, Do, Check and Act) cycle for: ➢ Improvements in one's own work ➢ Saving in energy, material and other resources ➢ Improvements in the working environment ➢ Improvements in machines and processes ➢ Improvements in jigs and tools ➢ Improvement in office work ➢ Improvements in product quality ➢ Ideas for new products ➢ Customers services and customer relations
System audit tool	May include but not limited to: • 5S audit • Patrol system • Kaizen board

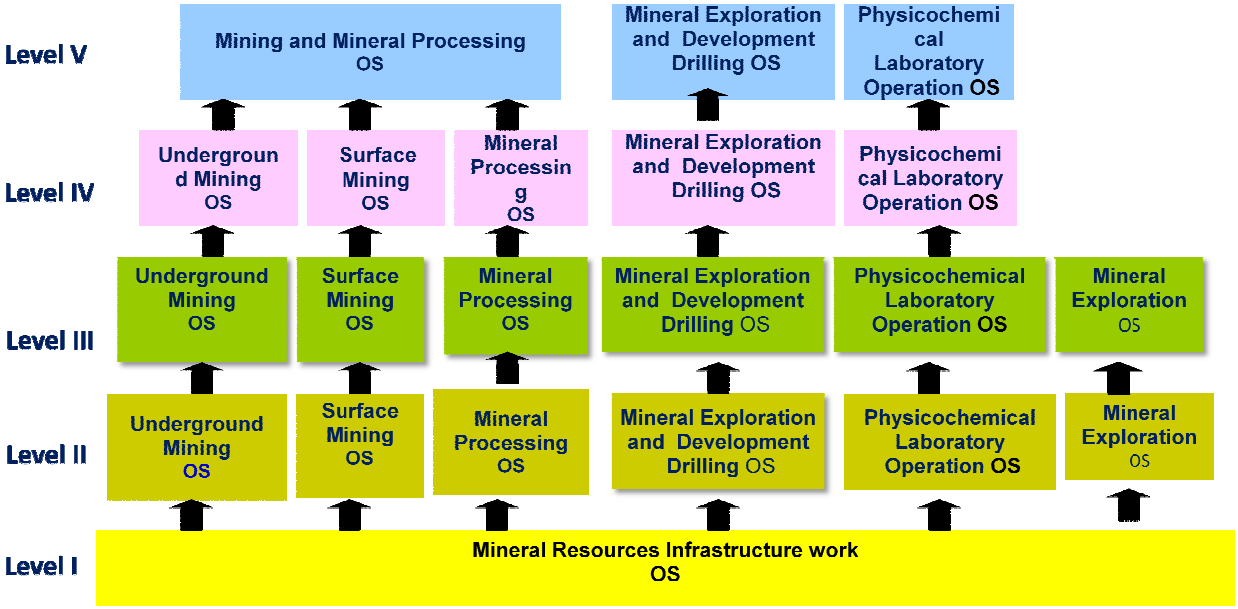
	• 5M check lists • Key Performance Indicators (KPIs)
Standard operating procedure	May include but not limited to: • Administrative standards for: ➢ Managing the business ➢ Administration ➢ Personnel Guidelines ➢ Job Descriptions ➢ Guidelines for preparing cost information • Operation standards for: ➢ Describing the way a job is done. ➢ Help realising Quality, cost, delivery. ➢ Addressing the need to satisfy customers. ➢ Using the process that's the best. ➢ Producing work in the most cost effective manner. ➢ Assuring total quality for the customer.
HR practices	May include but not limited to: • Resources may include: ➢ Recruit and retain high quality people with innovative skills and a good track, record in innovation • HR development is used for: ➢ strategic capability and provide encouragement and facilities for enhancing innovating skills and enhancing the intellectual capital of the organization • Reward will: ➢ Provide financial incentives and rewards and recognition for successful innovation

Evidence Guide	
Critical Aspects of Assessment	Demonstrates skills and knowledge competencies to: • Establish policy and cross-functional goals for kaizen • Deploy and implement goals as directed through policy deployment and cross-functional management. • Realize goals through deployment and audits. • Build systems, procedures, and structures conducive to kaizen. • Use kaizen in functional capabilities. • Introduce Kaizen as a corporate strategy • Provide support and direction between allocating resources • Establish, maintain and upgrade standards. • Make employees conscious through training programs. • Assist employees develop skills and tools for problem solving.

Underpinning Knowledge and Attitude	Demonstrates knowledge of: • Quality management and continuous improvement theories • creativity/innovation theories/concepts • competitive systems and practices tools, including: ➢ 5S ➢ JUST IN Time (JIT) ➢ mistake proofing ➢ process mapping ➢ establishing customer pull ➢ setting of KPIs/metrics ➢ SOP ➢ Kaizen elements/targets. ➢ identification and elimination of waste/MUDA ➢ continuous improvement processes including implementation, monitoring and evaluation strategies for a whole organization and its value stream ➢ Difference between breakthrough improvement and continuous improvement ➢ organizational goals, processes and structure ➢ approval processes within organization ➢ methods of determining the impact of a change ➢ customer perception of value ➢ Define, Measure, Analyze, Improve and Control (DMAIC) to sustain process
Underpinning Skills	Demonstrates Skills to: • Use leadership skills to foster a commitment to quality and openness to improvement. • Analyze training needs and implementing training programs • Prepare and maintain quality and audit documentation • Undertake self-directed problem solving and decision-making on issues of a broad and/or highly specialized nature and in highly varied and/or highly specialized contexts • Communicate at all levels in the organization and to audiences of different levels of literacy and numeracy • Analyze current state/situation of the organization. • Analyze individually and collectively the implementation of competitive systems and practices tools in the organization and determining strategies for improved implementation • Solve highly varied and highly specialized problems related to competitive systems and practices implementation and continuous improvement to root cause • Negotiate with stakeholders, where required, to obtain

	information required for implementation and refinement of continuous improvements, including management, unions, employees and members of the community. • Review relevant metrics, including all those measures which might be used to determine the performance of the improvement system, including: ➢ Key Performance Indicators (KPIs) for existing processes ➢ Quality statistics ➢ Delivery timing and quantity statistics ➢ Process/equipment reliability ('uptime')
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

MINERAL EXPLORATION, MINING AND MINERAL PROCESSING



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This occupational standard was developed in January 2014 at Addis Ababa, Ethiopia.

COMMENT TEMPLATE

The Federal TVET Agency values your feedback of the document.
If you would like someone to personally contact you, please provide the following information:
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